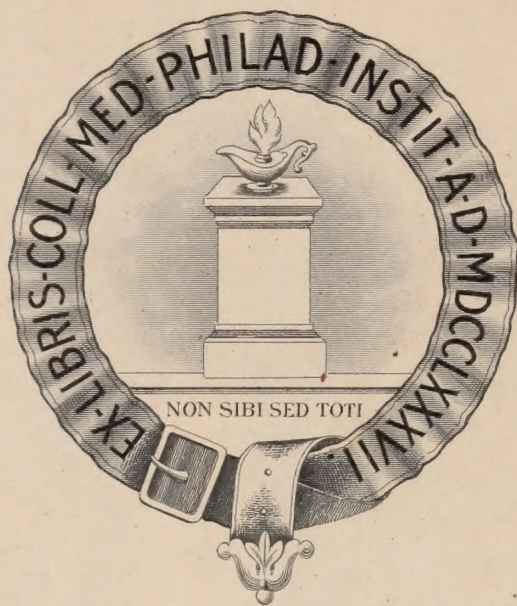




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EDITORIAL.

THE OPEN MEDICAL MIND.

According to our observations and the deeper ones of many acute students, the various minds, which are forces in the thinking world to-day, are striving to break through their narrow bounds, so that a larger view shall be theirs and a keener perception of what is necessary for their continual growth. The medical mind is not in arrear in recognizing what accretions would be of benefit, and yet, though evidences are not wanting to make us hopeful of the future, we must record that of all minds the medical is slower in developing along those lines, which would bring to it the true scientific spirit—the complexion which would have for its greatest virtue the ready understanding of gold and the baser metals, the separating power which can differentiate between grist and chaff. In rebuttal to this statement might be advanced the correct opinion that at no period in the history of medicine have physicians in general taken so active an interest in medico-sociological questions as at present, at no stage in its evolution has a similar willingness been shown to spread a goodly part of the medical feast before the public, so that he who runs may read. But—and here we do not wish to show our disapproval of what has been done, but rather a critical attitude as to the effect of these endeavors on the medical mind—can it be advanced by the unbiased medical looker-on that this confidential front, in regard to the public, has enlarged the medical point of view when brought face to face with discoveries of moment?—medical matters, be it understood, which, were they occurrences in other provinces of thought, would not be long in being accepted at their true valuation. Is it not a fact that our much-vaunted scientific spirit is almost as much warped by our personal feelings to-day as it was in the past,

and that we still cling to the rather antiquated definition of this same spirit by our almost daily declaration that, for the true essence of medical science to remain the object of our adoration, it must be shielded by the drop-shutters which each and every one of us, who has some knowledge of medicine and a vast amount of experience, has a perfect right to manipulate?

The past year, though no more remarkable in discoveries than many of the preceding years, was illustrative enough of our main point of contention, for though our judgment, if unhampered, would have had sufficient acumen to yield fair play to what had been accomplished in the matter of outstanding achievements, it again gave undeniable evidence of the many incrustations of prejudices and narrownesses, which unfortunately seem never divorced from it. To take but three epochal events,—chemotherapy, the application of radium, and the recognition of psychotherapy,—what have not been the variegated opinions that have been dinned into our ears by those, whose “experience” seemed sufficient justification for the desecration of very good paper by articles that did not stand foursquare but wobbled, since their only support was “an experience” that was pitifully small. But as usual the thinness of the writing was masked sufficiently, for the careless reader, by the fustian thought which always derives such unceasing sustenance from “my cases,” “my observations,” and especially from “my conclusions.”

Of the three subjects, which we have mentioned, none received so shabby a treatment in the American medical press as did that of chemotherapy, as illustrated by Professor Ehrlich's discovery. Directly one or another physician was fortunate enough to receive enough of the preparation to use on a very limited number of cases, his unscientific voice rang through the columns of some journal; and though his knowledge of the technique was declarative of the tyro and his mastery of chemotherapy indicative of the most superficial dabbler, he did not hesitate to visit on the German investigator his failures, though careful all along not to minimize his own share in his successes. Here was an instance of appealing to blind fate for succor in the matter of experimentation, and again compelling the scientific spirit to narrow its field of activity to proportions that could not result in anything else than an inability to judge with precision and accuracy.

When we predicate that the medical mind should be open, we do not advocate its reaching out for every stray bit of flotsam, the outpouring, perhaps, of some misguided and overheated mind that must seek satisfaction in print to assuage its ardor. Such a state of openness would soon be its undoing, for no judgment can be aught but weakened by on-

slaughters, that not only have the grave fault of occurring too often, but are derived with few exceptions from vagarious sources. But what we do mean is a mental condition that bespeaks a receptivity that is tempered by enough critical judgment to make short shrift of the freakish manifestations in medical literature, but is not blind to the worthiness of the things that have the distinctive hall-marks of the out-of-the-ordinary. As the medical mind is constituted to-day it appears to us, in our critical moods, to be a compound of so much that is extraneous and superfluous in the matter of what should be its real make-up, that its acumen is hardly to be depended upon in ferreting out, from the mass of so-called advances, the few wisps which are necessary to the strengthening and broadening of its scientific spirit.

Who has not met with the intellectually small physician, who is so wrapped up in a pet theory of his own that he considers it an attack on his amour-propre to remind him that something outside his sphere is causing a more decided eddying of the waves of thought than his obliquity of vision will admit? This specimen, though barely countenanced by the elect in medical circles, is an entity that must be reckoned with; for though one might at first glance think him an isolated case, and hence not worthy of much thought, a further study will show that he is one of a type that is all too prevalent in our communities. Now it is not that we disapprove of his infatuation of self, or of his resemblance to Dr. Lydgate in "Middlemarch," who was "always making a present of his opinions," for these foibles are shared by quite a number of medical men of decided intellectual force; but what we do deplore is a mental calibre that is just the sort to frown upon all advances in medical science, irrespective of their individual worth. If he could be made "to functionate" within his limitations, the baneful influence which emanates from him might be restricted, but having put a valuation on himself it needs must follow, according to the chronicling of his friends, that he is really a quantity of considerable superiority and that his words should not be scoffed at. The gracious opinions of his friends are just the sort of fuel he needs for his self-concentration, but even though they may have this virtue, is the scientific side of his mind strengthened so that breadth, clarity and sensibility will be its prime qualities? We doubt it.

The matter of the open mind, be it medical or lay, is not a new subject for contemplation or discussion; it has been before us these many years; but not until recently, when the leaven of a mild intellectual socialism was applied to so many accepted matters which our indolence had allowed to lie dormant, did it occur to the few that our mental status was not what it should be. Hence the reformers set to work and the results are not un-

gratifying. But in their enthusiasm to effect the desired changes in the lay mind they took no account of the medical mind or, perhaps, they thought that such reforms, as were desired, should come from within the ranks of medicine. And perhaps they were right in thinking that the medical man, inured as he must be to the shortcomings which should be corrected, would be the keenest critic of the matter, and the most enthusiastic to loosen the medical mind from its moorings and drive it into a clearer atmosphere. But have the printed words of the majority of the articles in our journals, or the spoken words which have fallen on our ears during the past twelvemonth, in connection with the three epochal events mentioned above, betrayed that our medical men have freed themselves entirely from those faults, which were considered undesirable foibles even by our medical forebears?

THE REGULATION OF DIET.

A person in a state of health and ignorance, gets along very well by eating when, what and how much, he chooses. That is to say, with his guardians' and, later, his own, accumulated experience, certain unpleasant experiences teach him a few rough rules as to frequency and amount of food, and the special dangers or inconveniences of certain forms of indulgence. It is true that much of the food that he takes in the belief that it is exceedingly rich in nourishment, such as soups, broths, and the coarse vegetables, is of little value; but the fact that eating is on the whole a pleasant task, there is usually plenty of nourishment from pie, crackers, peanuts, candy, etc.: things which rank very high in food value, but are generally regarded as pleasing to the palate, but more or less harmful.

The average layman, when he acquires a taste of the apple of knowledge, is apt to get very queer notions into his head and, when he attempts to eat by rule, he not only loses much of the reflex digestive stimulation due to appetite, and tends to become neurotic, but is very liable to injure his health directly by following out logical lines of diet unfortunately based on entirely wrong premises. For instance, we have known of a professional glass and metal eater who ate scrambled eggs, alone, to protect the stomach. The orthodox forms of nourishment (?) for convalescents are flavored flour paste, broths and frothy delicacies. Young men frequently overeat, especially of meats and other mainly proteid foods, under the impression that they can thus lay up a stock of energy as one can lay up an excess of money in a bank.

For a person in good general health, it is obviously better to depend on a fairly normal appetite and good luck than on various fallacious beliefs. Undoubtedly, so far as any one nutritive principle is concerned, nourishment by appetite means alternate periods of excess and deficiency, with corresponding loathing of or craving for certain kinds of food. Or, the loathing or craving may be too general to indicate what is required. Hence, probably, arises a large part of the benefit of trips to places where an entirely different dietary, even one apparently injurious, is available.

The state of affairs is very different, however, when we turn our attention from the diet of the hearty, active individual, to the operative case, the fever patient, or the one suffering from some more or less definite metabolic disease. Not to mention physiological and professional considerations, a regard for common honesty ought to condemn the physician who says, off-hand, to a hard-working, nervously-exhausted man, in winter: "Take nothing but milk, for a month;" or the one who considers it is worth two dollars to tell a man not to eat pie; or the one who, after doing a gastrostomy or enterostomy to prevent a patient from starving, prescribes a few cubic centimeters of a 5 per cent. solution of albumin three times a day; or the one who, having no idea of heat units, measures of weight or volume, is ignorant as to how much is required to prevent starvation in a typhoid patient.

Few physicians realize how important a branch of therapeutics, dietetics is, nor how far the armamentarium of the grocery and butcher shop may replace that of the drug store. Starting with baking powder and ending with cranberries and other vegetable products rich in benzoic acid, one could even treat gonorrhea dietetically, rather slowly and with a large percentage of failures, but still a good deal better than it has been treated by many a drug-user, up to the last few years. Animal extracts all properly come within the field of dietetics. We may state a personal practice for what it is worth: for years, the writer has practically never given cod liver oil but an abundance—though not an excess—of the ordinary, more delicate fatty and oily foods; also, that in the treatment of anemias, he has prescribed iron at the butcher's in nearly every case. Tea, coffee, chocolate, tobacco, spices and the saline and acid substances used in cooking or accidentally present in food stuffs, make up quite an extensive armamentarium.

Still, such phases of dietetics are of greater interest for speculation than matters of practical importance. The gist of dietetics, as regards the three classes of organic nutrients: proteid, carbohydrate and fat, is the furnishing of energy and reparative material to the body.

There is no royal road to dietetic skill. One must know how foods are

used in the body, how much is needed, and how much of each nutrient is contained in each food stuff. As in the case of medicinal therapeutics, one must study physiology, memorize doses, and, since for reasons not fully understood and requiring lengthy discussion, nutrition cannot be satisfactorily carried on by isolated, proximate principles, one must memorize the proportionate amounts of such principles in the individual food stuff, just as one must know the percentage of an active principle in a crude drug.

This means hard work, but by no means so hard as in the case of medicinal therapeutics; for the number of active ingredients are relatively few in dietetics and the raw food stuffs are much more amenable to classification.

OPINION AND CRITICISM.

A MODERN INTERPRETATION OF PLAY.

The tendency of a number of modern writers, when they wish to call particular attention to their subject-matter, or rather when they wish to explain the psychology of an act or a people, is not to follow in the beaten paths as regards titles, and carelessly name a book or article without special reference to the manner of the context, but to make the top-line illuminative of what is to follow. Thus, quite recently, we have read Havelock Ellis's "The Soul of Spain," Washburn's "Pages from the Book of Paris," which has been advertised as "The Soul of Paris in Word and Picture," and Dr. Richard C. Cabot's "The Soul of Play" in the *Atlantic Monthly* for November. Hence we see that the understanding of any subject is really very superficial until we get at its soul, and that this is not matter for derision is well shown in the Ellis book and, especially, in Dr. Cabot's penetrating study of play.

According to Dr. Cabot, we Americans know but little of the true definition of life as it should be, for in our hurry to acquire money we have concentrated all our forces on work, and have relegated to a deplorably insignificant position both recreation and affection. This thought will come as news to all those Americans, who have imagined themselves for years the greatest people on earth, not only on account of their prosperity, but because a special providence of their own ordering was supposed by them to have granted them all the benefits which could possibly fall to mankind. That they have been living in a delusive state, in regard to what should constitute happiness, is now made clear to us by Dr. Cabot in language that is restrained, yet at the same time forceful; and when the presentation of a subject is done so effectively and so impartially should we not at once admit that here is no over-statement of facts?

The topic which engages Dr. Cabot's attention is the matter of recreation, and not affection, for as he pertinently says, "some day perhaps a conference will be called to study, to nourish, and to conserve the other great life-force,—to the end that we may be less 'stupid in the affections.' " And with this dismissal of affection he plunges into the subject of recreation, and shows us in a short space of time that play need not necessarily be a waste of time, but the means by which we re-create our beings from depression into a more healthful state. For if relaxation can re-create—and who can doubt this even though the experience has been limited—a goal is attained that makes us saner beings, and deprives us of all those

crotchets with which work undiverted with play cobwebs our overtaxed brains.

As we understand Dr. Cabot's words, the soul of play is recreation, and this force is achieved not by athleticism, or the indulgence in a sport that must entail physical and mental depression, but by imbibing without effort the pleasant things around us; in fact, making of this effortless period in our stressful existence a cult of the most agreeable sensations: grace that pleases the eye and sounds that soothe, through the sense of hearing, the distraction wrought by the preceding hours.

Despite our belief in the truths of Dr. Cabot's paper, we feel that what he says will fall on indifferent ears, for the typical American will be loath to submit to this inactivity, though the results may be soothing enough. As we know him—and our knowledge is not restricted—quiescence is about the most difficult state for him to tolerate. Perhaps his ambition to be doing something, even when there is nothing to do, may be responsible for his dislike of quietude at any time, but what is really at the root of his restlessness is the unquenchable desire not to be second in any race, though the competition may, as in this instance, bring but few guerdons wherewith to garnish his reputation. He has evidenced this attitude in business, in sport and in athletics; so why should he be different when he engages in the new "sport" advocated by Dr. Cabot—relaxation and re-creation?

SCIENCE VS. ROMANCE.

A merely superficial estimate of the literary (?) output, during the past year, on the alluring subject of how to prevent sexual diseases, convinces us that many minds are working on the same subject, though unfortunately in so many directions that bewilderment is the result in many readers' minds. If there is any human brain large enough to hold all the theories and advice which have been gratuitously flung at us by all those who would think it a fatal mistake to allow the ink on their pens to dry, even for a moment, we have never come across it in our peregrinations; but then we may not have been looking for it; in fact, may have been so frivolous, even when science enthralled us, that its escape from our attention was predetermined. The young man of to-day, according to these medical philosophers, must arrive at a higher standard of morality or immorality,—it is not clear whether sexual intercourse without benefit of clergy must stop altogether or whether preventive measures, that will make this sort of sexuality less disturbing some weeks after, is the thing advocated,—and to reach these empyrean heights all that is necessary is for him to acquire the simplistic rules laid down by

one or another author or—and here our brain of limited capacity stands aghast—digest all the regulations which have appeared up to date.

Simplicity in the presentation of medical subjects has never been their strongest asset; but what directness, what clarity is in the purely medical article by comparison with the manner of the medico-sociological writers on sexual matters when divulging their many involved ideas as to what must be done by the aforesaid young man if the world is to be regenerated! Yes, undoubtedly, it is the young man upon whom all responsibility rests as regards the abolition of sexual diseases; and if he would listen to the preachments of the authors, if he would but remember why prostitution exists, why it is wrong for him to desire illicit intercourse, why he should divert his thought to other and healthier things, what preventive measures he should use should the overpowering desire seize him despite his high resolves, what the priceless value of judgment is in the matter of knowing when to refrain, and a few hundred other confidential “I told you so’s,” great will be his gain; but no greater than the world’s, for out of the purity of his life will come so delightful a period of peace and content for all beings here on earth that the fervent will no longer desire the millennium.

To effect this complete palingenesis of the young man has been the dominant note in quite a number of articles and books, and though we are sceptical as to its fulfillment, there is even with us the wish that it might be so. But it is an altogether different matter when advice is given as to how to prevent sexual diseases, especially when the advice is such that to follow it out to the letter would entail many minutes of uninterrupted labor. Here our scepticism would be rampant, for if fulfillment of the task were ever accomplished, it would be at the cost of all thought of prospective intercourse. Listen to the wise words of Dr. Victor C. Vecki (“The Prevention of Sexual Diseases”), who appears to be a modern Pepys of the alcove: “Before the act the sexual parts must first be washed thoroughly with hot water and soap, cold water to be used in preference to none; then the parts and surroundings, including the whole scrotum, liberally anointed with the calomel salve. After the act it is necessary to urinate, then another thorough washing and a careful rubbing in of the same salve. The washing and lubricating must comprise every fold and recess, not to forget the space below the frenulum. After the washing and rubbing in of the calomel salve, a few drops of the nitrate of silver solution are deposited in the meatus, which is for this purpose caused to gape as far as possible.”

Since there is no exact time mentioned when the washing and rubbing in of the calomel salve should take place—the author vaguely states “before the act”—we take it that to be most effective it should be done in the inamorata’s house or room. Of course, this interpretation on our part is taking great liberties with the author’s text,—we certainly must be wrong, since so well read a man as Dr. Vecki cannot possibly be un-

acquainted with Havelock Ellis's chapters on "The Evolution of Modesty," "Analysis of the Sexual Impulse," and "The Sexual Impulse in Women,"—for he may mean that the young man should make all preparations in his own home and sally forth for his quarry only after being thoroughly cleansed and salved. The spectacle of a number of young men thus "made up," undergoing all the mental tortures of an ataxic walk to prevent the ointment from becoming dislodged, would surely add to the gaiety of our otherwise humdrum streets.

LITERARY NOTE.

In Jane Addams' most recent publication, "Twenty Years at Hull-House," the reader will find enough to interest him, in case his predilections run in the ever-widening groove of settlement work. For here are told, not only the early and rather discouraging experiences of a worker whose persistency and single-heartedness are not her least qualities, but also the later experiences which were less discouraging, for then appreciation and encouragement were meted out in no stinted manner. Hull-House embodies in all its details the individuality of its progenitress; and it is well that this should be, for the history of most charities is only too often a sorry affair, since disorder and collapse are their most grievous chapter, on account of the wrangling which ensues from the absence of a master-mind. No such charge can be brought against Hull-House, for, during its uninterrupted career of twenty years, the guiding hand has not only been the same, but it has never wavered in directing the onward march of this institution to its present almost perfect goal. Hence the great lesson to be learned from the career of this woman, by all medical readers, is that only when an individual at the head of a charity has the ability to exercise perfect mastery is success assured; a fact, which has never been brought home to all medical thinkers in a more lucid manner than in Dr. Lauriston E. Shaw's Address on The Disorder of Medical Charity, delivered before the Stratford Division of the British Medical Association on November 3rd, 1910. Aside from what the book tells us of the uplift which has been diffused, from this centre of concentrated thought, throughout the many foreign neighborhoods which surround it, it has the right sort of literary grace, since here is illustrated Buffon's apothegm—namely, "The style is the man" or the woman, as it would be in this case.

ORIGINAL ARTICLES.

THE PRESENT STATUS OF THE NOGUCHI SYSTEM OF SERODIAGNOSIS OF SYPHILIS.

By HIDEYO NOGUCHI, M. D., of the Rockefeller Institute for Medical
Research, New York.

In 1909 I introduced a method of complement fixation-test for syphilis along the same line upon which the Wassermann test is founded. The construction of my method deviates, however, from the original in that there is in my method but little of what was originally incorporated by Wassermann. The reaction is the same by both methods, but the reagents employed in the two are quite different, and the theoretical and practical consequences arising from the differences in the reagents are matters which are of considerable importance.

When the Wassermann reaction was discovered and found to be of great aid in the diagnosis of syphilis, the medical profession was anxious to derive as much benefit from it as possible; but the difficulties associated with the preparation and the execution of the original method were too great for the test to be used beyond a narrow circle of investigators.

In order to render the test less cumbersome, attempts were made by different investigators to modify the technique so that a greater degree of simplicity might be attained. Thus one modification after another was proposed and tried from time to time, yet, unfortunately, they all failed because they were mostly the result of hasty performance and lacked proper scientific foundation. The chief cause of failure, on the part of the investigators, was that they concentrated their thought on simplification and regarded the question of accuracy as a matter of secondary importance. In my opinion, these modifications were not successful even as regards simplification, since the reagents employed were just as unreliable as in the Wassermann method, and the carrying-out of the test required the same knowledge of serology, which was the important point in the original method. The disappointment which prevailed in medical circles after these modifications were found to be failures was a severe blow to progress in the matter of simplifying the Wassermann method; and, even to-day, any modification, no matter how carefully constructed, arouses a degree of scepticism, on account of the

fixed idea in the medical mind that no improvement on the Wassermann method is possible, since all previous attempts were failures.

Despite these setbacks the science of serology is now making a steady advance. And this advance is only possible if the serologists apply themselves, in the best scientific manner, to the construction of methods which are theoretically more accurate, practically more delicate, and technically simpler than the complicated methods, which, by reason of their lack of simplicity, cannot be generally adopted.

The method which I introduced met at first with some adverse criticism and the result of this was that its general usage was limited, but all obstacles were removed one by one when its practical points were fully established. To-day I am justified in stating that the reliability of my method has been confirmed by all those who have adopted it.

In order to enable the reader to understand the differences between the original Wassermann reaction and my method, a brief comparison of the two is given below.

A. REAGENTS FOR THE TEST.

WASSERMANN'S METHOD.

Serum of Patient—

Must be heated to 56°C. for 30 minutes before being used for the test.

Requires ten times more serum than in the Noguchi method. Procured usually from a vein.

Antigen—

Must be prepared from the liver of a congenital fetus, which is not always suitable for use.

Selection of suitable preparations is essential. The mode of standardization is based upon an empirical basis.

Deteriorates rapidly and often, suddenly. The titration of the antigen every time before making the test is empirical. It is seldom that it remains unaltered longer than a few weeks. Recently certain workers employ an alcoholic extract instead of an aqueous extract, but Wassermann still opposes this modification.

Complement—

Guinea-pig's fresh blood-serum.

Blood-Corpuscles—

Washed corpuscles of sheep blood, 1 c.c. of 5 per cent. suspension.

NOGUCHI'S METHOD.

Heating at 56°C. not necessary, although an inactivated specimen can also be used.

One-tenth of the amount that is required in the original is sufficient. Procured usually from a finger or ear lobe.

Can be prepared from the liver, heart or kidney of man, beef, sheep, rabbit, etc.

Selection of suitable preparations is essential by a special standardization formulated by me. It is, however, comparatively simple and has a biochemical basis.

Deteriorates very slowly and never in a sudden manner. In an alcoholic stock solution it remains unaltered for at least one year. From this stock solution any quantity of emulsion can be prepared at the time of use.

Same as the original, only used in 2½ times less quantity.

Washed human corpuscles, either 0.1 c.c. of 10 per cent. suspension or 1 c.c. of 1 per cent. suspension.

Patient's corpuscles can be used for this purpose, thus one patient can supply enough suspension of corpuscles for the others as well. There is no necessity of obtaining blood corpuscles from a normal individual.

Amboceptor—

Immune serum of rabbit repeatedly injected with washed *sheep* corpuscles. It is essential to keep the serum on ice. Aseptic precaution is strictly necessary. A frequent titration is absolutely essential.

Immune serum of rabbit repeatedly injected with washed *human* corpuscles. When dried on paper it remains active for at least one year, and it seldom deteriorates in this form even when kept at room temperature. No asepsis is necessary. A frequent titration is not necessary.

B. TIME REQUIRED FOR CARRYING OUT THE TEST.

WASSERMANN'S METHOD.

Preliminary Tests—

The antigen, complement, and the amboceptor must be titrated just before making the main test. This requires, at least, two hours in the hands of an expert.

Main Test—

The test for the diagnosis is to be commenced after the preliminary tests. The main test requires about *twenty-four hours before the results can be recorded*. The actual time spent for manipulation and watching is about three hours.

NOGUCHI'S METHOD.

The preliminary tests are not necessary for the reason that the most changeable reagents such as antigen and amboceptor are in a stable form in this method. It is of course understood that once or twice in one month they should be titrated so as to ascertain their activity.

The main test is directly commenced. When a water thermostat is used the final outcome of the test can be recorded within *two hours*.

C. QUALIFICATION FOR PREPARING THE REAGENTS AND PERFORMING THE TEST.

In the original Wassermann method the reagents necessary for making the test must be prepared by those who are going to use them. The difficulties in handling these most changeable reagents demand a man of great ability and wide experience in this special field of work. He must also be an expert serologist; not one who occasionally does a Wassermann reaction, but one who devotes himself constantly to this line of work. No man should attempt to make a responsible test unless he is capable of preparing these reagents. In this method the preparation and performance of the test are *inseparable*.

In the Noguchi method the preparation of the reagents and the performance of the test can be *separated*. While the preparation of the reagents is to be entrusted to a skilled serologist, the performance of the test may be made by a physician who has had a certain amount of laboratory training and has gained enough experience in the actual technique for doing the reaction. The performer must, of course, understand thoroughly the properties of each reagent in use, and be familiar with various irregularities which may arise during the performance of the test, but all these requirements can be fulfilled by a beginner after he has done a few hundreds of tests. He is urgently warned against considering himself competent before a few months' training with the technique. This warning applies equally to regular laboratory workers.

D. CERTAIN IMPORTANT SEROLOGICAL CONSIDERATIONS AFFECTING THE RESULT.

Where Lies the Cause for a Negative Wassermann with a Positive Noguchi?—This phenomenon seldom occurs. It occurs with a specimen

of serum in which an enormous amount of the natural hemolytic amboceptor for the sheep corpuscles is present. One must not forget that a positive reaction can be easily made negative by adding more amboceptor to the test-tube. This is produced through the augmenting effect of the amboceptor in excess upon the activity of the complement. The same amount of complement can produce two entirely different amounts of hemolysis, when mixed with a smaller or larger amount of the amboceptor. Thus, an excess of amboceptor can convert a positive reaction into a negative or, at least, into a weaker. In human sera there exist variable quantities of natural amboceptor for the sheep corpuscles, but not for human corpuscles. Since the Wassermann method uses the sheep cells and the Noguchi the human cells, it sometimes happens that the reaction is negative with the Wassermann and positive with the Noguchi.

As the amount of the amboceptor in the Wassermann method becomes unknown through the presence of the natural anti-sheep amboceptor in the serum to be tested, it is quite irrational to titrate the complement, the activity of which becomes so different according to the amount of the amboceptor. This throws the quantitative meaning out of the Wassermann method. With the Noguchi method no such disturbance can result.

In building up the complement fixation-test on a quantitative foundation the Wassermann method has a very serious obstacle, because the amount of the amboceptor in that method is unknown, and, if it be determined by a special experiment, it cannot be removed from such a serum.

How to Avoid a Non-specific Positive Reaction with Unheated Human Sera.—It is most important to know that, when used in active states, certain specimens of human sera give a positive reaction with the antigens containing proteins. Thus, the antigens prepared by the method of Wassermann, or by extracting the tissues with alcohol, are unsuitable for use with the unheated human sera. In order to avoid this non-specific positive reaction I have recommended the use of pure lipoids consisting of phosphatids prepared by my method. In this form the antigen never gives the non-specific fixation with active human sera, yet the reaction with syphilitic sera is extremely sensitive. A few early workers, all without sufficient experience with my method, obtained a non-specific fixation with some active human sera, but they invariably neglected this vital precaution. There is no man now who obtains such a disastrous result and then rushes into print.

Some might ask why I do not take the native human complement (which is present in an unheated fresh specimen) into consideration. In answer to this question I must inform the inquirer that the human complement contained in the amount of serum I recommend in my method, is so weak that even *ten times* more of it cannot act upon the human corpuscles in the presence of the amboceptor therein employed. This does not apply to any other heterohemolytic system in which alien corpuscles

(such as those of the sheep) are employed. In *that* instance human complement is highly active.

Certain modifications (Hecht, Stern, Tschernogubow) of the Wassermann method use the complement of the patient, and hence the serum in active state. But, owing to the lack of knowledge in regard to the non-specific fixation, these authors employed the crude alcoholic extract as antigen. This resulted in obtaining occasional positive reactions with non-specific cases. I know that they could have avoided this difficulty by adopting my way of preparing the antigen. Criticism arose from various places against the use of an active serum for the test and this is fully justified. But, when one tries to criticize my method because of the use of active serum one errs, since I have long avoided this source of error by eliminating the proteins from the antigen.

Standardization of the Antigen.—In the Wassermann method as well as in almost all the other modifications (those which follow the original without any further investigation), the amount of the antigen-extract for the test is so regulated that the half of the quantity, which causes self-inhibition of hemolysis, is taken and tested with a large number of non-syphilitic and syphilitic sera, to see whether or not it gives a positive reaction with syphilis and a negative reaction with non-syphilitic sera. If it gives a positive reaction for syphilitic sera only in this quantity, the extract is declared suitable as antigen. Thus, to establish whether a given extract is suitable or not it takes a considerable length of time and a large number of specimens. This is based purely upon empiricism.

Let us now consider how difficult it is for average workers to select a suitable antigen in this way. It should be remembered that a positive reaction may be obtained with only *one unit of antigenic activity* or with *several*. With a strong serum, containing a large amount of the so-called syphilitic antibody, the reaction is the same, whether one or several antigenic units are employed. On the other hand, a weaker positive serum will give a complete positive reaction with *several* antigenic units, but only a slightly positive or even a negative reaction with *one* antigenic unit (as determined with a strong serum). From this one can easily see that different investigators are liable to employ various numbers of antigenic units. Under such conditions it is no wonder that the results often vary according to different workers. It really calls for the establishment of a more definite standard for the antigen.

In my method I have recently set forth a definite standard of antigen, and it requires only a comparatively short time to decide whether a given preparation is suitable or not. Briefly stated it is as follows: Take 1 part of a 3 per cent. solution of the aceton-insoluble tissue lipoid in methyl alcohol (stock solution) and mix with 9 parts of physiological salt solution. This will become an opalescent emulsion ready for determination. 1. Determine if the emulsion exerts any hemolytic action upon human corpuscles by using 0.4 c.c. of the emulsion upon the regular amount

of corpuscles for my method. If it is hemolytic the emulsion is to be discarded as unsuitable. 2. Determine if the emulsion in 0.4 c.c. is anticomplementary or not. If it is anticomplementary the emulsion is not suitable. When the emulsion is neither hemolytic nor anticomplementary we finally determine it for (3) the antigenic strength. In this determination the amount of the syphilitic serum should be that which gives complete fixation with a standard antigen (already in hand). Now take 0.02 c.c. of the emulsion just mentioned and make the regular fixation experiment with that syphilitic serum. If the hemolysis is completely stopped (positive reaction) with this quantity, the emulsion is suitable and should be used in 0.1 c.c. for the real test for diagnosis. The reason why I employ 0.1 c.c. of the emulsion in the test is to have at least 5 antigenic

(0.1
units ($\frac{0.1}{0.02}=5$ units), so that even the weakest reaction cannot escape the

detection. At the same time it is guarded from the hypersensitiveness of the reaction, because I have found, as experimental bases, that non-syphilitic sera do not give a positive reaction even with 0.4 c.c. of such an emulsion. The reason why I do not recommend more than 0.1 c.c. for one test is that no matter how many more antigenic units above a certain number (3 to 4 antigenic units) are employed, the reactions of varying degrees remain unaffected. We are, therefore, employing the maximum of the antigenic emulsion and the results are revealed to the utmost.

It does not matter whether the lipoids are obtained from man, animal or whatsoever tissue, so long as the three important properties (hemolytic, anticomplementary and antigenic) are determined according to the standard above given. The procedures for these determinations are certainly quite simple, yet they are based upon a definite biochemical foundation.

It may not be superfluous at this place to point out still other reasons why I came to employ the acetone-insoluble lipoids. In aqueous as well as in alcoholic extracts of tissues (especially autolysed organs, such as macerated fetal liver), there exists a large number of hemolytic and anticomplementary substances. With an aqueous extract it is easy to understand why the complement is completely fixed when the quantity of the extract exceeds a certain limit. The various proteins in colloidal state absorb the complement (so-called absorption phenomenon), a well-known fact since the time of Wild. For this reason an aqueous extract cannot be used beyond certain quantities. It often contains hemolytic substances, and cannot be used for this undesirable auxiliary action. With the crude alcoholic extract the amount of proteins is not so great as in the aqueous, but it contains certain other substances which remain inert in the aqueous but reveal their actions after being taken up by alcohol. These substances are soaps (highly hemolytic), neutral fat, various

fatty acids (the latter highly hemolytic and anticomplementary), cholesterol, etc. Owing to their presence the alcoholic extract cannot be used in a large quantity. It is not infrequent that a crude alcoholic extract is so hemolytic that it cannot be tested for the antigenic strength.

Contrasted with the aqueous and alcoholic (unfractionated) extracts the aceton-insoluble lipoids are usually non-hemolytic and only slightly anticomplementary, if at all. The antigenic property is strikingly strong with the majority of the preparations of these lipoids. As there are certain specimens which are exceptional to this, it becomes necessary to make selection of a suitable one by the method already outlined. For the technical details the reader is referred to my work which has just appeared.

In concluding this topic, I may mention the fact that, in the standard of suitable antigen for the Wassermann, the difference between the anticomplementary and antigenic doses of the extract is 211 or more (undetermined), while in my method the difference between the two is, at

least, 20:1 $\left(\frac{0.4}{0.02} = 20 \right)$.

Concerning the Estimation of the Strength of Reaction.—When the complement is completely fixed by the syphilitic serum and antigen, it is said to be positive or, according to certain investigators, strongly positive. But, who knows whether the same is caused by just that quantity of syphilitic antibody sufficient to fix that amount of complement or by a considerable excess of the antibody, unless a further analysis is made.

In the Wassermann method Citron introduced a method by which he aimed to estimate the strength of the reaction. His idea is to combine two different quantities (0.2 c.c. and 0.1 c.c.) of the patient's serum with two different quantities (0.2 c.c. and 0.1 c.c.) of antigen extract. When complete inhibition occurs with the smallest amount of patient's serum and that of the antigen, it is recorded + + + +, etc., until an imperfect inhibition with the largest quantity of both is designated as \pm , or doubtful reaction. He divides the intensity into + + + +, + + +, + +, +, \pm . It will be seen from the above that my method approaches the ideal of a quantitative method.

I have examined a large number (over 100) of sera from cases of syphilis treated with Ehrlich-Hata's "606," by this quantitative method. In certain instances we could detect the relapse, though clinical symptoms were no longer in evidence at the time.

The quantity of the serum required for a complete quantitative analysis by this method is only 0.1 c.c. On the other hand, the methods of Citron and Zeissler demand, at least, several cubic centimeters.

Where Other Modifications Stand in Serology.—In this connection I may also review, from the quantitative standpoint, one or two other modifications now in use in certain parts of Europe. The modifications

of Hecht, Stern, Tschernogubow, Foix, etc., utilize the complement of the serum of the patient under investigation. In these modifications the human complement contained in the specimen of serum takes the place of the guinea-pig's complement used in the original, as well as in my method. When the specimen gets old the native complement gradually deteriorates and no examination can be made with such a serum. It is absolutely necessary to examine the serum, while it is perfectly fresh, as the complement is a very unreliable substance. In the fresh state the amount of human complement in different specimens varies more or less, often considerably. Hence these investigators are working with an undetermined amount of complement. Besides, human serum contains various quantities of natural amboceptors against the alien corpuscles employed by them (sheep—Stern, Hecht; guinea-pig—Tschernogubow; rabbit—Foix), and the experimenters are in the dark as to the exact amount of the amboceptors they are utilizing.

The uncertainty of the quantities of complement and amboceptor is sufficient to show that these modifications are not suitable for any accurate quantitative work. Yet another thought, in regard to the impossibility of making any attempt to estimate the strength of the reaction, may be of some benefit for those who are in habit of considering every modification as *about* the same. With these modifications it is absolutely impossible to estimate the strength of reaction by using a smaller quantity of the patient's serum, because on dilution the serum loses rapidly and progressively the strength of complement and amboceptor so that hemolysis can no longer be produced,—and without a hemolytic system there is no fixation-test. Is it still fair for a critic to classify my method with these un-serological methods, simply because it is called a modification like the others? In truth, my method is very little of a modification; and having been constructed chiefly upon an entirely new series of experimental investigations and observations, it is quite inadequate in revealing a still stronger reaction. I have met with such specimens of sera which gave still complete fixation in quantities as small as 0.0006, 0.001, 0.005, etc. The smallest quantity used in Citron's estimation is 0.1 c.c. Another point of uncertainty in this scheme is that the number of the antigenic *units* in a given *volume* of the extract can vary so greatly that a uniform result comparable with one another is scarcely to be hoped for. Again, with regard to estimating a weaker reaction, it is not to be overlooked that the variations in the amounts of the amboceptor in each specimen alone can bring about any degree of reaction, without any relation to the actual amount of the so-called syphilitic antibody contained in the serum. In other words, the same amount of the antibody may give + + + +, + + +, + +, +, \pm , or—, depending upon the amount of the natural antsheep amboceptor.

Zeissler's plan runs in the same direction as that proposed by Citron, and cannot be considered quantitatively correct. The complement fixa-

tion-test carried out by my method permits, however, a fairly accurate estimation of the strength of the reaction. In this method we have a definite quantity, under perfect control, of four out of the five factors concerned in the reaction. It is not difficult to derive the value of one unknown factor when the other four factors are quantitatively known. Thus, we know the exact amounts of antigen, complement, amboceptor and corpuscles, and can easily determine the amount of the antibody contained in a given specimen of syphilitic serum. I prepare a series of test-tubes, and measure gradually decreasing quantities of the patient's serum into them. With these varying quantities of the serum I make the fixation-test in the usual way. By this means we are bound to find out the smallest amount of the serum which still produces complete fixation of the complement. This quantity of the serum contains *one* unit of the syphilitic antibody. Thus, by dividing the quantity of the serum recommended for routine work, that is, 0.02 c.c. of active serum, with the *titer* of a given specimen, one derives the number of the syphilitic antibodies examined in that serum. For example, a syphilitic serum which gives a positive reac-

tion in quantity of 0.002 c.c. contains 10 antibody units $\left(\frac{0.02}{0.002}=10\right)$. A

specimen with the titer of 0.006 c.c. contains 3.3 units $\left(\frac{0.02}{0.006}=3.3\right)$, and

so forth. There is not a single factor in my method which is in common with that found in the Wassermann method. In fact, it is a complete reconstruction of the entire process of the complement fixation-test for syphilis. To reconstruct a method after the manner of the newer investigations, which do not lack in strength, and thereby remove certain defects of the original is not the same thing as to omit one factor or combine more than two factors in one single medium, as is commonly done in these modifications, so as to reduce the technical labor necessary for the original method at the expense of the accuracy of the test. It reminds me of an invalid who, although most useful, is too heavy to be carried around and has one or two limbs amputated to lessen the burden. The invalid still works, but with a reduced efficiency. Notwithstanding the omission of one factor or combination of more than two factors in one medium, the labor and time consumed for carrying out these modifications are not at all economized. The preparation of the reagents and the performance of the test demand a man capable of doing both. Thus the aim of these investigators is not attained.

E. WHAT HAS THE NOGUCHI METHOD ACCOMPLISHED?

It is this phase of the subject which would interest the majority of the readers of this journal most. The most important practical question of the test is not whether it is easy to carry out, but whether it

TABLE I.
The results obtained with the Noguchi method in Syphilis.

Comparison with the Wassermann method.												
	Primary Syphilis		Secondary Syphilis		Tertiary Syphilis		Latent Syphilis		Congenital Syphilis		Cerebrospinal Syphilis	
	No. of Cases.	% W.	No. of Cases.	% W.	No. of Cases.	% W.	No. of Cases.	% W.	No. of Cases.	% W.	No. of Cases.	% W.
Noguchi.....	23	73.9	79	83.7	65	80.0	59	61.0	4	100.0	5	80.0
Fox.....	7	100.0	37	97.0	32	71.0	54	46.0	1	100.0	..	..
Kaplan.....	138	90.0	281	86.0	191	73.0	79	51.0	20	90.0	..	..
Swift.....	16	81.0	76	92.0	45	80.0	85	55.0	4	100.0	..	..
Corson-White.....	14	86.0	146	98.0	47	80.0	28	60.0	39	100.0	35	80.0
Kaliski.....	10	100.0	50†	94.0	75‡	60.0	..	..	11	100.0	15	66.0
Total.....	208	88.0	669	92.0	455	74.0	305	54.0	79	98.0	55	73.0
Without comparison												
Noguchi.....	70	..	197	..	177	..	270	..	17	..	5	..
Craig.....	90	..	163	..	74	..	55	..	9	..	..	..
Orleman-Robinson	29	..	48	..	60	..	33	..	10	..	..	..
Potter (Alf.).....	7	..	71	..	46	..	58	..	..	..	..	..
Groat.....	12	..	76	..	36	..	51	..	10	..	1	..
Berghausen.....	..	..	15	..	9	..	6	..	4	..	..	..
Total.....	208	..	570	..	402	..	474	..	50	..	6	..
Grand total.....	416	88.0	1239	92.0	857	74.0	779	54.0	129	98.0	61	73.0

*Includes very early cases. †Majority under treatment. ‡Untreated. §Includes latent cases. W.-Wassermann method.
N.-Noguchi method.

gives a reliable result as a diagnostic means. My system has been put to practical trial for nearly two years and applied to at least 10,000 cases of syphilis, parasyphilis, and various other non-syphilitic diseases. The same method has been adopted at different medical schools and hospitals, and is being introduced gradually into numerous clinical laboratories, where the original Wassermann method is not thought of being done. The Army and Navy Medical Schools of the United States have been using the test for some time. The Pasteur Institute of Paris has also adopted my method to the exclusion of all others. All the State Hospitals of New York, as well as a number of State Hospitals in other States, are employing it. So far as I am aware these investigators are not having any difficulty in obtaining uniform and reliable results.

TABLE II.

Compared with the Wassermann method.	General Paralysis						
	Blood serum			Cerebrospinal fluid			
	No. of Cases.	W. %	N. %	No. of Cases.	W. %	N. %	
	Corson-White	11	80	80	5	100	100
	Kaplan.....	61	65	72	..	...	...
	Kaliski.....	3	66	66	..	...	...
	Total.....	75	70	73	5	100	100
Without comparison	Rosanoff and Wiseman.....	56	..	80	44	...	86
	Noguchi.....	25	..	86	..	...	...
	Schradieck.....	4	..	100	..	...	...
	Groat	2	..	100	..	...	...
	Total.....	87	..	91	44	...	86
	Grand Total.....	162	70	73.4	49	100	93
Compared with the Wassermann method.	Tabes						
	Blood serum						
	No. of Cases	W. %	N. %				
	Noguchi.....	8	44	72			
	Kaplan.....	205	60	65			
	Corson-White.....	49	70	75			
	Kaliski.....	10	40	60			
	Berghausen.....	6	...	66			
	Fox	3	100	100			
Without comparison	Noguchi.....	125	...	68			
	Wagh	13	...	56			
	Total.....	419	62.8	72			

Syphilis and Parasyphilis.—In Tables I. and II. one sees that the percentages of positive reactions in syphilitic and parasyphilitic conditions are somewhat higher with my method, as compared with the results obtained with the Wassermann method in the same cases, when simultaneously examined by both.

The reason why my method is sometimes positive when Wassermann's may be negative has been fully explained in the theoretical considerations of this article, but the following results obtained by Kaliski may be interesting for the reader, as examples:—

TABLE III.
NOGUCHI METHOD POSITIVE, WASSERMANN NEGATIVE.

N.	W.	
Congenital syphilis.....+	—	Under Hg treatment till recently.
Secondary syphilis.....×	—	Under Hg treatment till 3 months ago.
Secondary syphilis.....+	×	Under Hg treatment.
Latent syphilis.....×	—	Chancre many years ago.
Tertiary syphilis.....×	—	
Tertiary syphilis.....+	×	Excess natural antisheep amboceptor.
Tertiary syphilis.....+	—	Gumma pyloric end stomach.
Tertiary syphilis.....×	—	Under Hg treatment.
Latent syphilis.....×	—	Chronic intermittent treatment 7 years.
Cerebrospinal syphilis.....+	—	
Cerebrospinal syphilis.....+	=	Wassermann almost negative.
Cerebrospinal syphilis.....+	=	Wassermann only suspicious.
Aphasia.	—	
Tabes.	—	Great excess antisheep amboceptor.
Tabes.	×	3 units natural amboceptor.
Periostitis, specific.....+	—	2 units natural amboceptor.
Stricture rectum.....+	—	Natural amboceptor.
Epiphysitis, specific.....×	—	
Endometritis (abortions).....+	=	Wassermann suspicious.
Osteomyelitis, specific.....+	×	Na natural amboceptor; goes negative on addition of two units artificial amboceptor.
Chronic endocarditis,nephritis.×	—	4 units natural amboceptor present.
Diabetis insipidus.....×	—	Excess amboceptor.
Hodgkin's disease.....+	—	Chancre about 20 years ago.
Proctitis.	—	Under Hg treatment till recently.
Ulcus cruris.....+	—	Chancre 25-30 years ago.
Spastic paraplegia.....×	—	Spinal fluid negative.
+, Positive. —, Negative. ×, Weakly positive to moderate. =, Only suspicious.		

Non-Syphilitic Conditions.—As mentioned already the value of the test depends upon its specificity. No method is of any diagnostic value, if the test gives a positive reaction in ordinary non-syphilitic diseases. Of course it is now a well-established fact that the Wassermann reaction is not a specific test for syphilis alone, as it usually gives positive reaction in mixed and tubercular forms of leprosy, and in yaws. It also gives a positive reaction in certain protozoal diseases, such as malaria and sleeping sickness. In malignant tumors and scarlet fever the Wassermann reaction was found to give occasional positive reaction, even in the hands of certain

workers. However, this is very rare. In this respect my method is not any different from the original, but it differs from all other modifications using active human sera in not giving a non-specific reaction as frequently as the latter do; a fact due to the difference in the antigen preparations. I am absolutely convinced that there is no danger of getting non-specific positive reaction with active sera so long as one uses protein-free aceton-insoluble lipoids selected by my standardization. That this conviction has been amply confirmed by other investigators may be seen from the following table:—

TABLE IV.

		+	—
Noguchi.	1642	....	....
Kaliski.	750	....	....
Jeffries und Pease.....	300	....	....
Schwartz.	250	....	....
Robinson (Orleman).	250	....	....
Lederer.	150	....	....
Fox.	113	....	....
Groat.	125	....	....
Corson-White.	183	....	....
Craig.	214	....	....
Potter (Alfred).	45	....	....
Schradieck.	100	....	....
Waugh.	30	....	....
	<hr/> 4152	<hr/> 0	<hr/> 4152

Some of the investigators have obtained positive reactions in certain non-syphilitic cases, among which leprosy is the principal disease. I refer the reader to the excellent work of Fox, who studied nearly 60 cases of leprosy with my method. In malaria, Craig obtained a positive reaction in the febrile stage of the disease, but a more extensive study of this disease seems desirable. Pellagra was once reported by Bass (using the Wassermann system) to give positive reactions in a large percentage of cases, but Fox and Litteras failed to confirm Bass's findings, having obtained negative results in nearly 50 cases examined by my method, as well as by the Wassermann.

Kaliski examined a very large number of patients at the Mount Sinai Hospital of New York, going from ward to ward without previous knowledge of the cases. He obtained the results upon which he based the following conclusions:—

As a result of more than a year's experience in the performance of the Noguchi and other systems of complement fixation-tests for syphilis, during which time I have examined more than a thousand specimens of blood, I am of the opinion that the claims of the originator of the anti-human system are well-founded.

The method is simple and easily carried out.

The reagents for use in the test can be prepared in stable form in cen-

tral laboratories, thus putting the test within the reach of some workers who would otherwise be compelled to do without this means of diagnosis.

A comparison of the Wassermann and Noguchi systems shows that the latter is at least as sensitive as the former in the earlier stages of syphilis, while in the later stages, in treated syphilis and in the so-called metasyphilitic conditions, it is more sensitive.

The Noguchi system is specific. Either active or inactivated serum can be used provided the essential technical procedures are carefully followed. A positive reaction therefore can be interpreted as evidence of syphilis with the same degree of assurance as applies to the regular Wassermann test.

The work of Pedersen, Orleman, Robinson, Craig, Waugh, Groat, Schradieck, and others in dermatology and genito-urinary conditions, of Moore, Rosanoff, Wiseman, Atwood, Kaplan, Corson-White, and others in psychiatry and neurology, of Martin Cohen and Bulson in ophthalmology, of Fowler in otology, shows conclusively that the method introduced by me gives a reliable and uniform result in the hands of those who mastered the technique thoroughly.

CONCLUSIONS.

1. The complement fixation-test for syphilis by the method introduced and developed by me is specific in the same degree as is the Wassermann method. It is somewhat more sensitive than the Wassermann in syphilis and parasyphilis, but is not too sensitive as to endanger the diagnostic value of the test.

2. My method is especially suitable in following the effects of anti-syphilitic treatment on account of its delicacy.

3. My method is strictly quantitative in construction, having every factor entering the reaction under quantitative control. By this method the estimation of the strength of the positive reaction can be made in an accurate way. The Wassermann method is defective in this special point, as no quantitative work is possible with that method.

4. The quantity of the blood required for my method is nearly one-tenth of that needed for the Wassermann. The time and labor for carrying out my method is very much less than for the Wassermann.

5. The preparation of the necessary reagents and performance of the test may be separated and done by two different sets of workers. The performer of the test is not required to be capable of preparing the reagents in order to get reliable results, while in the Wassermann method the performer must be capable of preparing the reagents before his results are to be trusted.

6. The most essential and difficult reagents for the test are made stable in my method, while this is not yet accomplished for the Wassermann

method. The adherents of the latter still follow the formula in detail laid out by Wassermann several years ago, hence their reagents are in a most unreliable state.

7. From the foregoing it is a benefit for every physician to specify which method he desires to be employed for examination of his specimens. The two methods are not equivalent in yielding the exact results.

ON THE MEANS OF FINDING THE SPIROCHÆTÆ PALLIDA
WITH SPECIAL REFERENCE TO THE INDIA
INK METHOD.*

By J. S. COHN, M. D., of Chicago.

The large number of investigations which have recently been made upon the etiology of syphilis practically all started with the discovery of Schaudinn and Hoffmann in 1905,¹ of the *treponema pallida*. The importance of this discovery and of the subsequent work proving the etiological relation between this spirillum and syphilis has been great, and it was only through the establishment of lues as a spirillosis that the therapeutic endeavors of Ehrlich have been possible. As is well known now, Ehrlich's first studies were made on animals infected with spirilla, and later extended to syphilis in animals and men. Before the *treponema pallida* was identified as the cause of syphilis, the disease was a clinical entity, the diagnosis depending mainly upon the symptoms, the important ones of which appeared in the secondary stage some time after infection occurred. Vigorous treatment then could not be instituted until the diagnosis was made, i. e., in the secondary stage, as it would be unsatisfactory, if not unjustifiable, to submit a patient to a two years' mercurial treatment for a suspicious non-specific lesion which resembled lues. On the other hand, if the lesion were specific, by the time the secondaries appeared, the system would be so saturated with the causative agent, that treatment was at a disadvantage. Now that the etiological factor is identified, and the treatment is at hand, the latter can be instituted at once, providing the diagnosis is made. This practically depends upon finding the *spirochætæ pallida* in the various lesions present.

The evidence that the *spirochæta pallida* is the cause of syphilis can be summed up as follows: First, the almost constant demonstration of the *spirochæta pallida* in the products of the various syphilitic lesions; second, the finding of these organisms in the organs of fetuses and infants inheriting active forms of syphilis; and third, the transmissibility of the syphilitic virus to the lower and higher monkeys and to the eyes of rabbits, guinea-pigs and dogs, and the recovery of the *spirochætæ* from the lesions produced. Although the cultivation of the organism on artificial media is a matter of considerable difficulty, objection on this ground to its being the etiological agent is no more justified than doubt that the *plasmodium malariae* causes malaria. The *treponemæ pallida*

*From the laboratories of the Michael Reese Hospital, Chicago.

are found constantly in all chancres and the regional glands and in all condylomata and mucous patches. In these they are far more numerous than in any other lesion, which corroborates the former evidence that the disease is especially communicable through lesions of this nature. They may be demonstrated in other secondary lesions such as the papillary syphilide and less often in the tertiary lesions; and are also found in the placenta and fetal organs of still births due to lues. Noeggerath and Staehelin² claim to have found them in the circulating blood.

These organisms are found both in smear and tissue preparations. In smears, they are found by staining, by the dark field illuminator and by the India ink method. As the same material is employed in the above three methods, it is well here to describe the manner of obtaining it. The lesion which can be any of those mentioned above is first cleansed if necessary with soap and water to remove any pus or granular epithelial debris. Sometimes the irritation produced by the gauze alone on an ulcerated surface will bring forth numerous bleeding points. At other times the surface of the lesion, especially a mucous patch or papule, must be curetted with a small scalpel or other sharp edged instrument, until the flow of serum is produced. The lesion should be curetted where the sound and necrotic tissue join, and sometimes the floor of the lesion must be scraped. As only serum is desired, any blood is wiped away, and the eroded surface compressed firmly with gauze. This checks the hemorrhage, and immediately upon removal of the gauze there is a copious flow of serum from which a drop or two can be taken for smears. The serum should exude from the living tissue, as the *spirochæta pallida* is a true parasite and lives in the tissue, whereas the *spirochæta refringens* is only a surface grower.

The serum should be spread on the slide in a thin film. Of the stains several have been employed, the results of which show that the anilin dyes impregnate the protoplasm of the *spirochætæ pallida* to but a slight degree and that solutions containing eosin and azure blue will stain the *pallida* more intensely. It is upon the latter fact that the Giemsa stain depends. This stain was first used by Schaudinn and Hoffmann (l. c.), but since then various modifications have been employed with the object of lessening the time for the staining reaction which was always a disadvantage, being from eighteen to twenty-four hours in duration. Practically all the modifications are of equal value, so only one will be described here.

Schereschewsky's³ method is very simple and has met with considerable success. The slides are air dried and passed through the flame three times. The staining mixture is freshly prepared by adding 13 drops of Giemsa's solution (Grueblers) to 10 c.c. of a 0.5 per cent. watery glycerine solution. The mixture is heated to boiling and poured on the slide for three to five minutes. It is then poured off, the slide washed in neutral distilled water, dried rapidly in air and a second application

of the stain then made. A third and fourth are made if necessary. The treponemæ stain deep pink with the background pale in comparison. In the above method it is important that the slide or coverglass be free from grease and that the test tube and slide forceps should be clean, free from acid and any precipitated stain.

Various modifications of the original polychrome methylene blue-eosin stain of Romanowski have been adapted for staining the spirochætæ pallida but not generally used. Geraghty⁴ has employed Hasting's stain with excellent results. The smears are dried in the air and covered with the stain for one minute. Then distilled water is added until a metallic lustre appears, and the smear is stained for five minutes more. They are then washed in running water, dried and examined. The pallida stain faint blue with a pinkish tint and the refringens a deep blue.

Stern's⁵ silver method for smear preparations stains the spirochætæ pallida intensely black, but it causes a swelling of the cell body and they do not appear as delicate as they are. It is as follows: Dry the smear in air and place in the incubator at 38° C. for several hours, then in a 10 per cent. solution of silver nitrate in a colorless glass container which is allowed to remain in diffuse daylight for some hours until the film appears brown with a metallic lustre. Better results are obtained by exposure to weak diffuse daylight for three to five days.

The dark ground illuminator is certainly effective for rapid diagnosis and one has the advantage of seeing the organism in the living state, observing its various movements and manner of reproduction, but owing to the nature of the apparatus required, its employment is rather limited. As the spirochætæ are poorly refracting bodies, they shine through as light areas upon a dark background.

The reason special reference is laid upon the India Ink method, is because of its extreme simplicity and the fact that anyone with even a moderate knowledge of the microscope can have within his reach a rapid microscopic diagnosis of syphilis. Burri⁶ in 1909, noticed that bacteria were not stained by India Ink and that their presence in thin smears left clear spaces. Hecht and Wilenko⁷ in the same year, published their observations that the treponema pallida was easy to identify by this method, and Fruehwald⁸ later published his very complete article on this method of finding the treponema. Serum is produced from the lesions as for the above smear preparations. One loopful of serum is mixed with one loopful of India ink on a glass slide and the mixture is immediately spread over the slide in a thin film by drawing the edge of another slide over the first, as in making a blood smear. The film dries in half a minute without heat and should be dark brown to black in color. It is placed at once without mounting or further fixation under the oil immersion lens. On examination, the whole field is seen to be of a homogeneous brown or black color, with the spirochætæ, blood-cells, and other extraneous material shining through as colorless refractive bodies. When present in

moderate numbers, they are usually observed in a very short period of time. The glass slides should be perfectly clean so that the India Ink will adhere. By this method, the refringens and other spirilla are also readily found, and occasionally one may find both the pallida and refringens in the same preparation. So simple is this method that we have found spirochætæ pallida under the microscope three minutes after first seeing the patient. There are practically no drawbacks to this method, except in the use of certain preparations of ink in which too many granules are present. The best ink to employ is the Chin-Chin liquid pearl ink, manufactured by Gunther-Wagner, though fair results may be obtained by other inks, such as Carter's or Higgin's.

The recognition of the spirochætæ pallida depends upon the observer's ability to differentiate them from other spirillæ and to appreciate their distinct morphological characteristics. In size it varies in length from 7 to 21 microns, *i. e.*, about one to three times the diameter of a red corpuscle. This comparison is beautifully shown by both the dark ground illuminator and the India Ink method. Longer forms are sometimes seen, but they are probably two or more organisms. It has the shape of an extremely slender thread, closely wound in a cork screw form, the windings being very acute and absolutely regular. When seen with the dark ground illuminator, they are observed to rotate on their long axis in either direction. The motion is very rapid but not necessarily accompanied by a change of position. They progress from place to place but not so rapidly as most other forms of spirichæta, and they have a quick and spasmodic bending or twisting motion, which increases as the specimen grows older.

A careful microscopical examination renders the differentiation of the treponema from all other spirilla certain. The majority of these on account of their coarser form, their irregular and broader convolutions and their greater affinity for stains, can scarcely be confused with the spirochætæ of syphilis. The spirochæta refringens is very readily differentiated as it has no points in common, and when once seen along side of the treponema pallidum it can never be mistaken. Its thread is thicker, it has but four or five convolutions which are much broader than those of the pallida and of a more wavy form. It is a surface grower and is found in suspicious lesions. The spirochætæ buccalis and dentata both have thicker threads which are wider than the pallida and have fewer and less angular convolutions. These are found in unclean mouths and teeth. Vincent's spirillum resembles very closely the spirochæta refringens, but as it is always associated with the fusiform bacillus, it should cause no confusion, especially when making smears from lesions on the tonsils.

In summarizing the literature of the last five years on this subject, it is evident that most workers agree that the spirochæta pallida is the cause of syphilis. The methods of demonstrating the organisms have passed through the long and tedious Giemsa stain to the extreme sim-

plicity of the India Ink. Schaudinn and Hoffmann (l. c.), Schereschewsky (l. c.), Geraghty (l. c.), White and Avery,⁹ and numerous others report excellent results with the Giemsa stain or with its modifications. No one doubts the efficacy of the Levaditi method for demonstrating the *spirochætæ pallida* in tissue sections. The dark ground illuminator is by all means the most efficacious, showing the living organism and permitting the study of fresh untreated material. The India ink method has met with considerable favor wherever it has been tried. Barach¹⁰ recently criticised this method on the ground that the ink itself contains substances sufficiently similar to the *spirochætæ pallida* to confuse one who is not an expert microscopist. This criticism referred especially to the Higgins ink, but he also found similar wavy bodies in various other inks tested, including the Gunther-Wagner, the use of which has been generally advocated. In numerous observations totalling about four hundred, we have never found in smears made with the Gunther-Wagner ink, any artefacts resembling the *spirochætæ pallida*. These organisms, when once seen, leave such a vivid and definite impression that it is impossible to confuse them with anything else. Higgins and Carter's ink, we have never used as a routine procedure, as they are too granular, but we have made many smears of both inks, and in none of them was anything resembling a *spirochæta* seen. Indistinct wavy detritus may be seen, but it does not resemble the *pallida*.

Our personal experiences have been limited practically entirely to India ink. Early in our work it was found that pictures obtained by this method and by the various stains, could not be compared in definiteness. The very numerous examinations to be made, rendered the routine use of the dark field illuminator difficult.

Through the kindness of Dr. Jobling, we were given the opportunity of studying the cases of syphilis treated at the Michael Reese Hospital, with Ehrlich's "606." We were able to examine lesions of all sorts, especially chancres, mucous patches and secondary skin lesions, both before and after injection. All told approximately four hundred examinations were made. In every case except those which had been previously submitted to a long mercurial treatment, the *spirochætæ* were easily and quickly found. It should be emphasized here as a safe rule to follow, that if any doubt exists that an organism is the *spirochæta pallida* or not, one should without hesitation, give a negative report. We cannot state too strongly that the picture presented by the India ink method, is absolutely sharp. The gradual disappearance of the organisms following injection of comparatively small doses of "606," was in striking contrast to the rapid disappearance following larger doses.

How valuable the India ink method is for the demonstration of the *spirochætæ pallida* in scrapings made from syphilitic tissue, such as fetal liver or placenta, still remains in some doubt. Our experience has not been very extended or conclusive, as at times we have found them in the

tissue and at other times we have been unable to demonstrate them even when later studies with the Levaditi stain showed their presence. It seems to us, that with the proper maceration and extraction of tissue, one should be able to obtain a homogeneous mixture with India ink, permitting its use here instead of the long Levaditi stain, and at present we are attempting to demonstrate the feasibility of this procedure.

In conclusion, I wish to thank Dr. J. W. Jobling, for permission to make this report, and Dr. S. Strouse, for assistance in its preparation.

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THE HISTORY AND METHODS OF APPLICATION OF EHRlich'S DIOXYDIAMIDOARSENOBENZOL.

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For many years before Paul Ehrlich was able to achieve his purpose, it had been his desire to enlarge the scope of the hitherto accepted principles and limitations of pharmacology. He was not satisfied merely to determine the toxicity of different drugs, and their effects upon the circulation and the various organs of healthy animals; or to leave unanswered the main therapeutic question—namely, how drugs really act upon the causative factors of parasitic diseases. In 1905 the opportunity he had so long been waiting for was given him, by the founding of an institute in the city of Frankfort, devoted exclusively to the carrying out of his ideas. Here was started the new science of Specific Chemical Therapy, or Biological Therapeutics. He set to work to make many new drugs: drugs that would be specifics for one particular parasite and above all to study how these drugs were distributed through the body and how they acted upon the parasites themselves. He conducted these studies not upon healthy animals but upon animals infected with a particular parasite. Sleeping sickness, or better the trypanosome, was selected as the first parasite which should be studied.



Béchamp's incorrect formula for Atoxyl.

Atoxyl was brought into prominence in medicine first by Thomas in the Liverpool School of Tropical Medicine, and, as it proved to be a drug possessing great trypanocidal properties, it was then used by Kopke on sleeping-sickness patients in Africa. As this drug fitted into Ehrlich's plans, he started to study the drug itself and its properties. It was first discovered by Béchamp, a French chemist, in 1863, who believed it to be a very loose combination of anilin and arsenic acid; in other words, that a molecule of nitrogen intervened between the arsenic-acid group, and the benzol ring of the anilin.

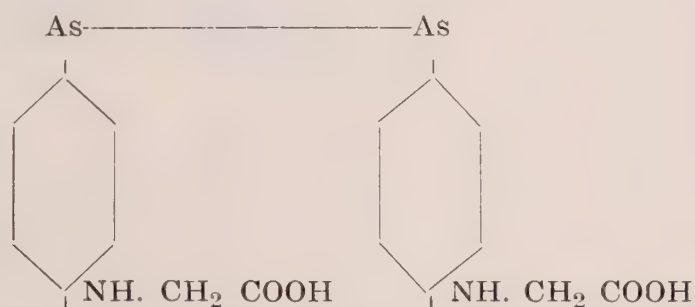
*The author's prolonged stay abroad has been made possible by a grant from the Rockefeller Institute for Medical Research, New York.

Ehrlich soon discovered,—and the same thing was soon thereafter discovered independently by Prof. Puckner, in the laboratory of the American Medical Association,—that the product was a very stable one, contrary to Béchamp, and that the arsenic-acid group was connected directly with the benzol ring of the analin, and that the amido radical was



Ehrlich's (the correct) formula for Atoxyl.

in the para-position to the arsenic-acid group. This discovery showed that the product was capable of withstanding many different kinds of chemical manipulation, and many different substitution products could be made from it. The history of dioxydiamidoarsenobenzol can be said to have had its origin in this discovery, as it is but a modification of one of the main reduction products of atoxyl. In changing this substance by the introduction or removal of certain radicals, it was found that it could be made more or less toxic at the will of the chemist.

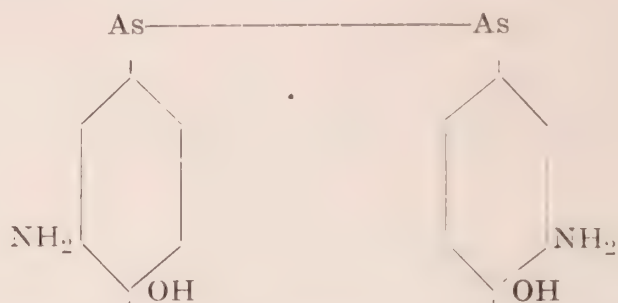


Formula of Arsenophenyglycin.

Ehrlich had also previously found that trypanred, a dye-stuff which had no effect whatever upon the trypanosomes when mixed with them in a test-tube, possessed, on the other hand, great trypanocidal properties within the body. He explained this paradoxical action by assuming that the trypanred was reduced within the body into a trypanocidal substance. This explanation was verified by his experience with atoxyl and its substitution products. He found that the reduction products which he made outside the body were more active in the body, proportionally to the amount of their reduction. So products were made more and more reduced (and these were then further modified) until one was found, the 418th—Arsenophenyglycin—which in one injection cured all animals even in the last stages of trypanosomiasis. This drug was then turned over to the workers in Africa, and Ehrlich began his study of syphilis.

This arsenophenylglycin contains arsenic in the reduced state, that is threevalent arsenic, and is a double combination, known as the arseno combination.

By removing the incomplete acetic-acid radical from its combination with the amido radical, and introducing a hydroxyl radical in the para-position to the arsenic-acid group and placing the amido group in the ortho-position we have 606.



Formula of Dioxydiamidoarsenobenzol (606).

The substance was first tried on chickens infected with spirillosis and on mice infected with the spirillum of relapsing fever. Hata soon found that one-fifty-eighth of the *dosis tolerata* would suffice to cure a heavily infected chicken, and also that a very much smaller dose than the *dosis tolerata* was required to cure a mouse of relapsing fever. He next studied the effect of this drug on syphilis working with rabbits. The rabbit is infected by introducing under the skin of the scrotum a small portion either of condyloma from a human being, or better, as it is done in the laboratory, from the testicular chancre of a previously infected rabbit. In a few weeks a typical chancre develops, which if allowed to run on, involves the entire scrotum. In these lesions the spirochætæ pallida exist superabundantly. Hata found that one-seventh of the *dosis tolerata* was sufficient to cause all the spirochætæ to disappear entirely from these lesions within forty-eight hours, and to cause complete healing of the ulceration in a few weeks. The next step was to start treating human beings, which was most difficult. Very few men could be found who were willing to be the first to be injected with such a powerful and unknown drug. In Prof. Conrad Alt of Uchtsprunge, Ehrlich found both a willing and more than satisfying helper. Alt had previously had experience in injecting paralytics with arsenophenylglycin, which he had done in the most careful and painstaking manner. In this same way he undertook to introduce the treatment of human beings with "606." First he studied the effect of "606" upon dogs, and its excretion from the body. Then two of his assistants volunteered to have themselves injected with the drug, which was then not yet so perfected as it is now, and the solution was very strongly alkaline. They paid for their heroism with many days of the most severe pain. As the drug did not produce any other unsatisfactory symptoms, its introduction into human therapy was inaugurated. Since then much has been written and more has been said

about it, and a great deal of experience has been gained. Many methods have been suggested, tried, and after a longer or shorter period of time, have been found wanting in some particular, and discarded. Strange to say, our experience has taught us, that the original methods, advised at first by Ehrlich, are still the best and are the ones that should be used.

The technique of injecting "606" must be divided into two main heads: First, the intramuscular injection of the clear alkaline solution; and, second, the intravenous injection of the alkaline solution either by the method of Schreiber or Weintraud.

The results obtained have forced Ehrlich strongly to recommend, that the neutral suspension method of Wechselmann, Michaelis and Blaschko, and the injection of the sterile liquid paraffine suspension, as suggested by Kromayer, be abandoned. Unfortunately the clear alkaline solution causes considerable pain in many cases, but if it rapidly brings about the disappearance of longstanding lesions, which other drugs have failed to affect, this disagreeable, merely temporary, effect should certainly be overlooked. The alkaline solution is prepared in the following manner: Into a thin, 25 c.c. graduated cylinder with a ground glass stopper about



FIG. I.

two dozen small glass beads are put. The stopper is then inserted and the whole is then sterilized in dry heat. In order to avoid repetition it must here *emphatically be stated*, that all the apparatus used in the injection and the hands of the operator, as well as the field of injection, must be *thoroughly sterilized*, since many of the bad results that have been reported have been due to carelessness in this direction.

Nine c.c. of hot distilled water are now poured into the graduated cylinder and the mouth of the cylinder is then dried with a piece of sterile gauze, to prevent the substance from sticking to it. The tube containing the substance after having been washed in alcohol and ether is opened by means of a glass cutter and the substance poured into the cylinder, which is now closed with the glass stopper and well shaken for about one to two minutes when the substance will be found to be completely dissolved. From a drop-bottle a 15 per cent. solution of sodium hydrate is added drop by drop to the solution in the cylinder which is thoroughly shaken between each drop. After a few drops have been added to the solution the substance will start to precipitate, and this will continue until sufficient sodium hydrate solution has been added to cause

the substance to redissolve. The clear alkaline solution is then ready to be injected. Care must be taken to shake the contents of the cylinder well between each drop of the sodium hydroxyde solution, as in this way the clear solution will be obtained with the smallest possible quantity of the alkaline solution, and the less there is of the latter the less pain is produced. Various substances have been added to this solution to lessen the pain, but, as the greatest pain appears on the second or third day, these have very little effect. The writer has found that 1 c.c. of a 2 per cent. carbolic acid solution, if added to the solution and mixed well with it just before injecting, prevents a great deal both of the immediate and later pain. The 9 or 10 c.c. composing the finished solution should be injected as quickly as possible, after the preparation has been made, deep into the gluteal muscle either on one or, divided, into both buttocks. The dose used for the intragluteal method is about 0.08 c.c.

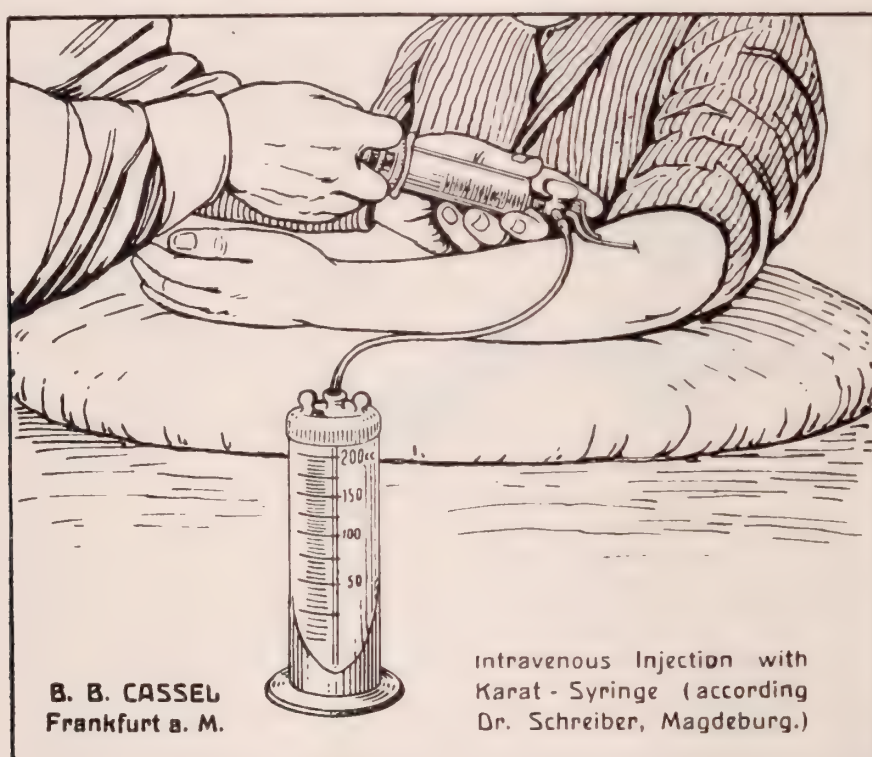


FIG. II.

As to the Intravenous Methods.—Schreiber's method* is carried out as follows:—The special needle used (Fig. I.) is in the form of a bayonet and is fitted with a three-way-cock which allows the solution to be drawn up into the syringe through a rubber tube from the special graduate, and a simple turn of the cock allows the injection of the fluid into the vein. The cock is again turned and the fluid is again drawn up into the syringe and more is then injected into the vein; this process being kept up until the desired quantity has been infused. Of course the needle must first of all be securely placed in the vein (Fig. 2), which is made easier by cutting off the venous circulation in the arm, by fastening a rubber tube

*Schreiber: *Muenchener Medizinische Wochenschrift*, No. 39, 1910.

around the arm until the cubital vein swells sufficiently to allow the insertion of the needle, when the rubber tube is loosened. Schreiber prepares his solution in the following way:—

In a graduated cylinder holding 250 c.c. with a small neck and a ground glass stopper he puts 10 to 20 c.c. of hot water. Then he pours in the substance and shakes the solution until the substance is completely dissolved. Sufficient warm, sterile water or physiological salt solution is added to bring the quantity up to 100 c.c. Then for every 0.1 of substance he adds about 0.7 of normal sodium hydroxide solution. The whole is then well shaken until the resulting precipitate redissolves. If this resolution is not complete after thorough shaking, a few drops of the alkaline solution are added, and this is continued if necessary, until an absolutely clear solution is obtained. Salt solution is then added up to the 200 c.c. mark. The solution is then poured over into Schreiber's special glass, and is then ready for infusion.

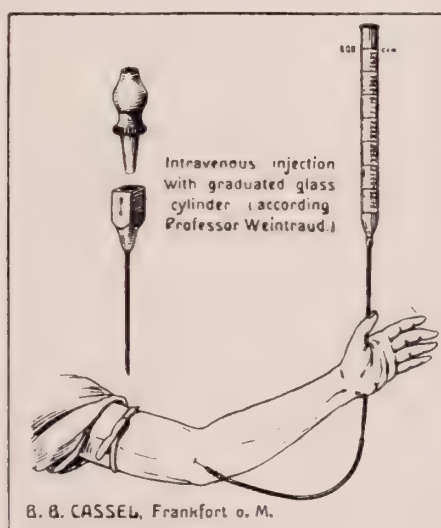


FIG. III.

Special care must be taken with this method not to inject any air into the vein.

The Weintraud* method is simpler and preferred by the writer. Here a special needle (Fig. 3), but a simpler one is also used, which the figure sufficiently explains. The solution is prepared as follows:—The substance is placed in a short broad cylinder in which 30 to 40 c.c. of hot sterile water have previously been poured. The substance is assisted to dissolve by rubbing it against the walls of the cylinder with a glass rod. When the solution of the drug is complete it is poured into a flask containing 200 c.c. of warm physiological salt solution. One-fifth normal sodium hydroxide solution is now added in small quantities, until the substance precipitates and again completely dissolves. This requires about 20 c.c. for 0.5 gm. of 606. Here also an excess of the sodium solution is to be avoided, and this can best be done by shaking well the flask containing the solution after each few drops of the sodium hydroxide

*Weintraud: *Medizinische Klinik*, No. 43, p. 1683, October, 1910.

solution are added. The clear solution is then poured into the long glass cylinder (Fig. 3), all the air being expelled by an assistant who also controls the flow of the fluid. The front part of the needle is inserted into the vein as described above, the blood is allowed to flow, the constriction above is removed, and the rear part of the needle which is attached to the rubber tubing is then inserted, care being taken that an inrush of air with the first flow of the fluid is prevented. Both Weintraud and Schreiber advise simply dressing the puncture with a piece of adhesive plaster immediately after the removal of the needle.

The advantage of the intravenous method is that very little discomfort is caused the patient at the time of the injection—only the needle-prick is felt—and no pain is felt at all thereafter. And the substance is brought immediately and in the greatest possible concentration into direct contact with the parasite. These are the reasons why Ehrlich now recommends the general use of the intravenous method.

General Remarks.—Because of the confusion in the available statistics and because of the smallness of the dose that is being used, it is almost impossible to ascertain at the present time, what percentage of patients can be completely cured with one injection of the drug. We know, however, that many recurrences have occurred, and as the specific action of the drug upon the spirochætæ has absolutely been demonstrated we should now try our utmost definitely to cure our patients. If at some future date it is found that a much larger dose given in the alkaline solution, intramuscularly, is sufficient completely to conquer the disease, then we would be justified in abandoning Ehrlich's present attitude. This will surely be the case, as the *dosis tolerata* for a human being computed from the average *dosis tolerata* for all animals would be 5 to 7 gm. At present Ehrlich regards the matter as follows:—He says, a patient should be injected intravenously (0.4 to 0.5 gm. for women, 0.5 to 0.6 gm. for men), and this injection should be repeated from three to eight days after the first injection. If at the end of four weeks the Wassermann reaction is still positive another injection should be made. There is absolutely no danger in frequently repeating the intravenous infusion of "606" from the standpoint of hypersusceptibility. On the contrary, it appears that the patient stands the second injection better than the first.

In Conclusion a Word of Warning.—About the time of the appearance of this article, "606" will be put into the hands of the profession at large. It must always be remembered that it is a most powerful medicinal agent, and the greatest care must be observed in using it. Only those specially trained should use it, or else they will suffer grave disappointments. During the first six months of its general use it will surely be exploited by the unreliable and its real value will frequently be questioned. Only after it has passed through this stage and become concentrated in the hands of the capable will its worth be recognized and Paul Ehrlich's latest discovery be given the place that it truly deserves.

SYPHILIS OF THE NERVOUS SYSTEM.

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With the exception of parasyphilitic diseases, which have separately to be considered, syphilis produces in the nervous system pathological lesions exactly akin to those produced elsewhere in the body; the special features of syphilis of the nervous system therefore altogether depend on the physiological peculiarities of this system. The variability of syphilitic lesions and the complexity of neurological symptomatology combine in making the subject of the present paper an extraordinarily extensive one, a fact well illustrated by the richness of the latest monographs on the subject.* It will obviously be possible here only to select from it a few general considerations or special points of particular interest to the practising physician.

The chief lesions produced by syphilis may histologically be enumerated as follows: primary toxic degeneration, small-celled infiltration, and reactive proliferation of connective tissue-elements. In a given case any one of these may be not only more prominent than the others, but may constitute the chief feature; this influences not only the clinical course run by the condition, but also the symptomatology. The second type of lesion is apt to cause acute affections which in a short time recover, either partly or completely; the other two lead to more chronic states, which are also on the whole distinctly less amenable to treatment. Added sources of complexity in the clinical picture are due to the facts that syphilitic lesions are most often numerous and irregularly distributed, and that in a given case different forms of lesion may either coexist or succeed one another. Variability and irregularity are thus features of the affection that are important from a diagnostic point of view; they are rarely met with in the same degree in any other nervous disease with the exception of disseminate sclerosis.

It has further to be remembered that syphilis may affect the nervous system in indirect ways, the most obvious of which is through affections of the cerebral blood-vessels or of other neighbouring structures, such as the enclosing bony cases. Neuroses may be causally related to syphilis in a variety of ways: first through the bodily exhaustion due to severe

*Mott: *Syphilis of the Nervous System*, 1910; Nonne: *Syphilis und Nervensystem*, 2 Aufl., 1908. Of the two the former is perhaps the better on the pathological side, the latter on the clinical.

general syphilis, secondly through the mental impression produced on sensitive subjects by the idea of having contracted what is popularly thought of as a loathesome and guilty complaint, not to speak of various possible domestic complications, and thirdly, in the absence of the disease, through the haunting dread of infection known as syphilophobia.

It will be most convenient to consider the various effects of syphilis on the nervous system in the order of the lesions mentioned above. One form of primary degeneration of the nervous tissue, which has given rise to much discussion and investigation, is that described by Erb in 1892 under the name of "syphilitic spinal paralysis." The spinal cord is more or less implicated in the majority of cases of syphilis of the nervous system, usually by a number of local lesions, but Erb maintained that occasionally the disease affects the cord alone, and in a peculiar way, namely by causing a diffuse degeneration, principally of the pyramidal tracts. The symptoms then are those characteristic of spastic paraplegia, from the pure type of which it differs, however, in the presence of slight sensory disturbances, with paræsthesias, in the early occurrence of bladder troubles, and in the rigidity being less pronounced than might be expected from the amount of increase in the deep reflexes and from the markedly spastic gait. At least half a dozen autopsies of this condition have been made; the degeneration found is not confined to the pyramidal tracts, but is diffusely distributed, implicating particularly the posterior columns as well; strictly speaking, it is not a systemic degeneration such as is found in amyotrophic lateral sclerosis and other diseases. The prognosis is generally, though not uniformly, bad, and at any time the case may be complicated by the occurrence of other syphilitic disease.

Another condition in which primary toxic degeneration plays a large part is a certain type of idiocy. Recent investigations by Plaut, Dean and others have shown that the Wassermann reaction is present in the blood in more cases of idiocy than might previously have been suspected. It is not yet definitely known what proportion of cases of ordinary idiocy is due to congenital syphilis, but it is certainly a considerable one, possibly amounting to twenty per cent; the Wassermann reaction may be found even when no other signs of congenital syphilis are evident, just as it may in adult cases of parasyphilis.

The second type of lesion is the most frequent. There is no part of the nervous system, and no form of tissue contained therein, that it may not affect. In the great majority of cases both the brain and the spinal cord are affected, but in most of them the lesions predominate in one of the two. Of the two the brain is more often affected. Usually, as was mentioned above, one finds a combination of different types of lesion; thus it is very common to find syphilitic changes in the cerebral arteries, with the mechanical consequences of these (softening, etc.), at the same time as numerous gummatous formations, or a more or less diffusely distributed infiltrative process.

The peripheral nerves may be affected by syphilis in several indirect ways, for instance by pressure or extension from lesions in neighbouring structures, glands, bones, etc. Up to the present it cannot be regarded as proved that syphilis may produce a primary, parenchymatous, peripheral neuritis, either local or general. In cases where the symptoms point to the diagnosis of neuritis it will usually be found that local infiltrative or proliferative lesions are present. Perhaps the most frequent affection in this group is the so-called syphilitic root-neuritis. The spinal nerve-roots may become affected in a variety of ways: they are sometimes pressed on by a pia that is inflammatorily thickened, they may become secondarily infiltrated by an inflammatory process beginning either in the pia or in the blood vessels, changes in the vessels may induce secondary atrophy of the nerve-roots, and finally gummata may begin here as well as elsewhere. One never finds any of these lesions without finding co-existent ones in the spinal cord as well. It is disputed whether syphilis can cause true neuralgia or migraine apart from the usual gross local changes, but it is not probable.

The symptoms of syphilitic affections of the cord are those of cord affections in general, and the special features reside rather in the distribution and course than in any characteristic group of symptoms. Thus, to take a single example, paraplegia may be produced by gummata growing from the vertebral periosteum, from the meninges, or in the substance of the cord, by vascular disease, by a meningo-myelitis, a focal chronic myelitis or an acute transverse myelitis. Evidently the features of the paraplegia will vary according to whether the lesion is local or diffuse, single or multiple, intra-medullary or extra-medullary. There is hardly any spinal cord disease that may not be mimicked by syphilitic affections; the typical clinical pictures of syringo-myelia, of anterior poliomyelitis, of Landry's disease, of cerebro-spinal meningitis, a Brown-Séquard syndrome, may all be produced by syphilis alone, facts often not realized, and of obvious importance for diagnosis. Much attention has been paid in recent years to the frequency with which a mild form of meningitis occurs during the secondary stage of the disease; the symptoms due to this, lumbar pain, paræsthesias and weakness of the limbs, slight irritability of the bladder, and increased activity of the deep reflexes, had long been recognized as being typical of "meningeal irritation," but the findings of lumbar puncture have shown that there is present an actual inflammation of the meninges.

The prognosis of most syphilitic affections of the cord is a serious one, perhaps more so than is generally thought. In some forms it is almost hopeless; the acute transverse myelitis, for instance, is usually rapidly fatal. It is always wise to give a guarded opinion concerning the future, for even cases that apparently recover are often found to suffer from later troubles, when they are watched over a number of years.

Disease of the arteries plays an important part in the spinal affections,

but it is rarely so predominant as it is in many of the cerebral cases, where it may constitute the principal lesion. The results of syphilitic disease of the cerebral arteries are the same as those of any other diseases of these, and can be distinguished from them only by collateral evidence. The commonest are those due to partial or total occlusion; it is characteristic for these to be for some time of a prodromal nature, due to the former condition, such as diffuse, boring headache, spells of faintness, transitory attacks of weakness or numbness in one or more limbs, etc. Total occlusion, with thrombosis, leads to the usual consequences of this, which vary according to the rate of onset, site and extent of it. As throughout is the case with syphilitic affections of the nervous system, transitory manifestations, partial effects, and irregular recurrences, are common. For instance a temporary paresis of one limb may occur, to be followed by a slight aphasia, and then perhaps by a total hemiplegia or triplegia. Cerebral hæmorrhage is a far rarer effect of syphilitic arterial disease than thrombosis, though it sometimes occurs, particularly after the formation of aneurisms in the larger vessels. In ordinary cerebral hæmorrhage, due to atheromatous changes with or without the formation of miliary aneurisms, it is probable that syphilis is only occasionally the pathogenic factor.

Chronic syphilitic meningitis over the convexity of the brain is, perhaps more than any other syphilitic affection, marked by variation between progressive and retrogressive changes, with a corresponding fluctuation in the symptoms. The lesions are more pronounced in the dura, whereas those of basal syphilis are more pronounced in the pia. The most constant symptom is the characteristic form of headache. Others, in the order of their frequency, are: giddiness, vomiting, mental changes, pupillary alterations, epileptiform attacks with or without paralyses, and, more rarely, choked disc, sensory disturbances of the cortical type, speech anomalies, and hemianopsia. They are throughout, therefore, the symptoms of irritation of different areas of the cortex. The epileptiform attacks may present any type from the well-known Jacksonian one to the general attacks of "idiopathic" epilepsy; they are frequently followed by a temporary paresis of one or more limbs. It is important to bear in mind that sometimes the only symptom of this affection, and of syphilis of the nervous system altogether, is a series of epileptic attacks, which in so far as the attacks alone are concerned may be indistinguishable from those of "idiopathic" epilepsy. The alterations in speech are sometimes of either an aphasic or an articulatory nature, but often are neither, consisting merely in a thickness of enunciation like that of great fatigue.

The syphilitic affections at the base of the brain are perhaps the best known and most frequent of all. From the fact that the lesions are most often extra-cerebral it is comprehensible that the symptoms are predominately those of affections of the cranial nerves. Of these some are much more often implicated in the disease process than others, and this

is especially true of the ocular nerves. Uhthoff, who has perhaps had the largest experience in the matter, states that they are in one way or another affected in 85 per cent. of the cases of cerebral lues. The optic nerve itself is frequently affected; this was the only ocular nerve to be so in 20 per cent. of Uhthoff's cases, and he found changes in it in fourteen out of seventeen autopsies on cases of cerebral syphilis. It may be affected primarily, *i. e.*, from an intra-neural gumma or degenerated arteries, or secondarily, from disease in the pia mater. The ophthalmoscopic signs differ according to whether the lesion present is a choked disc, an optic atrophy, or a descending optic neuritis; this is the order of frequency of the lesions. In the commonest condition, that of choked disc, the swelling of the disc and the distension of the veins are greater than in the cases of optic neuritis, but the opaque swelling of the retinal tissue with hæmorrhages and white spots around the macula are not so marked. On the side of the symptoms the following points are noteworthy: the defect in vision rarely goes on to complete blindness, as it so often does in cases of tumor cerebri and hydrocephalus; under treatment all symptoms and signs may in lucky cases altogether disappear; the perimetric changes are very variable, but on the whole the periphery of the field suffers most with a parenchymatous neuritis, and the central portion with a secondary perineuritis. The optic chiasma is a favourite site for syphilitic processes, which may then either descend or ascend. Hemianopsia is by no means an uncommon occurrence; it is stated that 10 per cent. of all cases of homonymous hemianopsia are of syphilitic origin, and 15 per cent. of all cases of heteronymous. The former kind is more frequently met with than the latter, and when the hemianopsia is heteronymous it is practically always bitemporal; there is only one instance on record of syphilitic binasal hemianopsia.

The motor nerves of the eye are also affected with extreme frequency. It is probable that more than half of all cases of ophthalmoplegia are due to syphilis. As a rule it is a relatively late affection, but cases are on record where the onset was as early as three months after infection. Any part of the nerve may be implicated, from the nucleus to the muscle; the commonest lesion is gummatous meningitis which has caused either compression or infiltration of the nerve substance. Of the three nerves in question the oculo-motor is the one most commonly affected, in two-thirds of the cases; Uhthoff's figures are: oculo-motor 66 times, abducens 29, of the cases; Uhthoff's figures are oculo-motor 66 times, abducens 29, trochlear 6. Bilateral symptoms are rather more frequent than unilateral; partial paralyses, of one or more muscles, more than total ophthalmoplegia. Of the external ophthalmoplegias ptosis is considerably commoner than any other; the internal ones concern predominantly the pupillary reactions. Non-reaction of the pupil to light may be throughout the only symptom of cerebral lues, or it may be the only one to remain after the others have disappeared under treatment. In general it must be said thatluetich oph-

thalamoplegias are more refractory to treatment than other luetic conditions. The three chief diseases from which they have to be distinguished are tabes, cerebral tumour, and disseminate sclerosis. There is no absolute point of distinction as regards the eye symptoms between tabes and cerebral lues; one has always to depend on evidence obtained elsewhere. Still one may say in general that bilaterality, totality and durability are features that point to the latter condition rather than to the former, and that a dissociated pupillary paralysis (Argyll-Robertson sign), or a pronounced optic atrophy, points more to tabes. The paralyzes of disseminate sclerosis are more often transitory and incomplete; nystagmus is usually present, but not pupillary fixation to light.

Basal syphilis produces of course other symptoms than those just mentioned; amongst them should especially be mentioned headache, vertigo, affection of other cranial nerves, particularly the trigeminal, facial and acoustic, and pareses of the limbs.

Some general remarks may now be made concerning the diagnosis of syphilis of the nervous system; it is impossible here to enter into the matter of differential diagnosis. In the first place I would warn against attaching too much importance to a positive or negative history of previous infection. The various fallacies in both directions are so numerous and gross that one is in this way easily lead into error. A negative history proves nothing at all, and should never even weigh against the diagnosis of syphilis if there is reason to make it. A positive history is chiefly of value in countries such as many parts of Ireland and Canada, where syphilis is as yet relatively rare; in most parts of the world the information that a patient has probably had syphilis is not novel enough to be of much significance in deciding whether a given group of symptoms are or are not due to this disease. A positive Wassermann reaction, on the other hand, is another matter, since, in the absence of certain tropical maladies, it demonstrates the present activity of a syphilitic process. Care however should be taken that the reaction is carried out by a specially competent person, and with the original technique; some of the modifications recently attempted, notably those by Noguchi in this country, are quite unreliable. Again, the fact that the date of infection is unusually recent or remote should not weigh too much against the diagnosis of cerebro-spinal syphilis; cases have been reported as recently as two months after the infection and as long as forty years after, though most often they occur between the first and sixth years.

The distribution of the lesions and the course run by the disease is an important matter. Irregularity is here the rule: numerous areas of the nervous system are picked out in apparently the most haphazard way, and the symptoms may fluctuate from time to time to such an extent as almost to suggest a psychogenic malady. It should be borne in mind that most syphilitic lesions are on or near the surface of the nervous system; one would hesitate very much before making the diagnosis of

sypilis when the symptoms pointed to a deep-seated lesion, *e. g.*, a thalamic tumour. Here the general rule of neurological diagnosis is of especial value—namely, that one should first try to determine the *site* of the lesion, then the pathological nature of it, and only lastly its cause.

Finally a word should be said about the diagnosis by means of anti-syphilitic drugs. This is a method open to serious error, for on the one hand cerebro-spinal sypilis is often notoriously refractory to such measures, whereas on the other hand they frequently have a temporary influence on non-syphilitic affections of the nervous system. The point is of especial practical importance in regard to the diagnosis of cerebral tumour, a matter that has not here been discussed. Fibrous gummata are, perhaps, more resistant to drug treatment than any other syphilitic lesion, and in many cases it is advisable to remove them by operation. On the other hand, with non-syphilitic tumours, *e. g.*, gliomata, valuable time is often lost through the encouragement given by a temporary relief of symptoms that has been brought about by drugs. In a case of cerebral tumour the practice should always be to operate at once provided the Wassermann reaction is negative, and never to wait to see the effect of drug treatment.

The prognosis of cerebro-spinal sypilis is in general a serious one, owing to the frequency with which it resists treatment, and to the pronounced tendency to late recurrences and grave complications. Various factors affect the outlook. For instance, this is worse in cases where the onset of the disease is many years after the date of infection, or when other diseases or cachexias are present, particularly tuberculosis and alcoholism; it seems to be worse also in cases where the early manifestations of sypilis were slight. Unfortunately there is not much reason to believe that thorough treatment in the early stages is a satisfactory guarantee against the later occurrence of cerebro-spinal sypilis, but on the other hand energetic treatment at the onset of this certainly has an important influence on the course it will run.

We have last to consider a few points concerning parasypilitic affections of the nervous system. These affections are of especial importance in that they are commoner than true cerebro-spinal sypilis, are even more serious in their effects, and resist anti-syphilitic treatment. It is not definitely proved that there is any other parasypilitic affection than general paralysis and tabes, though it is very possible that certain forms of progressive spinal muscular atrophy are also of this nature. As general paralysis and tabes are essentially the same disease, differing merely in their distribution and course, they may here be considered together. The inference reached years ago on deductive grounds, that these conditions cannot occur without a previous syphilitic infection, may to-day be regarded as conclusively proved, so that the evidence need not here be recapitulated.* In the case of general paralysis, the form that has been most

*See Ernest Jones: *The Pathology of General Paralysis. Alienist and Neurologist*, November, 1909, p. 577.

extensively investigated, the blood serum gives the specific Wassermann reaction with such constancy that the absence of this is sufficient to exclude the disease; even with the cerebro-spinal fluid the reaction is positive in 95 per cent. of the cases. With tabes the reaction is for certain definite reasons less constant. Research along these bio-chemical lines has taught us much concerning the pathogeny of the disease.* It is highly probable that tabo-paralysis is not a direct consequence of the nervous system being poisoned by the syphilitic virus, but that it arises, so to speak in the way of a by-product, as a result of the metabolic changes that are concerned in the production of specific responses to this virus. It is even possible that the so-called Wassermann anti-body is the actual pathogenic factor, though probably the matter is more complicated than this.

It is not necessary here even to outline the well-known clinical manifestations of tabo-paralysis, but a word may be added on some recently acquired aids to the diagnosis of it, thanks to which we are nowadays practically always able to make it with certainty. The value of the Wassermann test has just been referred to; it is especially useful in differentiating the condition from cerebro-spinal lues, for in this the reaction is at least five times less common with the cerebro-spinal fluid than it is in tabo-paralysis. Unfortunately it often happens that application of the test is inconvenient or impossible, owing to the inaccessibility of a special laboratory. In these cases the other evidence that may be gathered from clinical examination of the cerebro-spinal fluid is of great value, for this can be obtained by any practitioner. The two most important aids here are the cell-count and the proteid estimation. In no other chronic condition is such a high cell-count seen as in tabo-paralysis, and when it exceeds forty or fifty one can be almost certain that we have to do with this disease; the diagnosis can be confirmed by a differential examination carried out by Alzheimer's method. A still simpler matter is the investigation of the globulin content, which is considerably increased in this disease.** Many tests have been devised for this purpose, by Nonne and Apelt, Pandey and others. In my experience the two most reliable are the Noguchi butyric acid test, and the ammonium sulphate ring test described by Ross and myself. Of the two I have found the former more valuable in a negative direction and the latter in a positive.

The subject of treatment has not been touched on in this paper, as it will be dealt with by other contributors to the present symposium. As to the marvellous Ehrlich-Hata discovery it seems at present that so far as cerebro-spinal syphilis is concerned this will be of more value for prophy-

*See Plaut: *Die Wassermannsche Serodiagnostik der Syphilis in ihrer Anwendung auf die Psychiatrie*. 1909; and Ernest Jones: *A Review of Our Present Knowledge Concerning the Sero-Diagnosis of General Paralysis*. *Amer. Jour. of Insanity*, April, 1909, p. 653; *Modern Progress in Our Knowledge of the Pathology of General Paralysis*. *Lancet*, July 24, 1909, p. 209.

**Ernest Jones: *The Proteid Content of the Cerebro-Spinal Fluid in General Paralysis*. *Rev. of Neurol and Psychiatry*, June, 1909, p. 379.

laxis than for treatment. If the present high promise of this remedy is fulfilled it will be by no means Utopian to anticipate a day when syphilitic affection of the nervous system will become a rare disease. Such a triumph of medical science would be a check to certain lines of neuro-pathological research, but in my opinion this would be more than compensated for by the much-needed impetus it would give to non-histological, *e. g.*, psychological, lines of psychiatric investigation.

THE TREATMENT OF SYPHILIS WITH EHRlich-HATA "606"—SALVARSAN.

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It must be apparent to all by this time, that the genius of Paul Ehrlich has given to the therapeutics of syphilis the most potent remedy that has ever been known. Many thousands of cases have already been treated with this new remedy, in the hands of numerous clinicians, and with exceedingly few exceptions, all are agreed that this new preparation constitutes a most invaluable addition to our armamentarium in the management and control of syphilis.

This preparation is intended to reach the parasites in the body which cause the disease, *i. e.*, the spirochetes pallida, and destroy them in one dose, in accord with Ehrlich's chemo-therapy. For many years, he aimed to find a substance that was not only destructive to the parasites (parasitotropic), but at the same time, not injurious to the body of the host (organotropic). Ehrlich believes that the new arsenobenzol preparation, or as it has been named, *Salvarsan*, is not organotropic but parasitotropic, and hence the ideal remedy for a cure of the disease by the method of "therapia sterilisans magna." Indeed, clinical evidence is accumulating every day, in all quarters of the globe, that this belief of Ehrlich has been substantiated by actual test.

Already a large literature has grown up, particularly in German, giving detailed accounts of the chemical and physiological action of the drug, and illustrating by description of actual cases the method of its action. Hence, it is not deemed necessary, in this paper, to discuss these features of the remedy; the list of articles and papers thus far published on the subject may be found in the excellent collection of references published by Fordyce,* Engelbach,** and Stein.† The principal contributors and pioneers in the use of the new remedy have been Iversen, of St. Petersburg; Alt, of Uchtspringe (near Berlin), and Wechselmann, of Berlin. These were the first to use the drug, and their particular methods of administering it are used generally wherever the drug is being experimented with. The intravenous method, *i. e.*, the injection of a very dilute alkaline solution into the veins, is known as Iversen's Method; the intramuscular injection of an alkaline solution, is known as Alt's Method;

*Fordyce: *New York Medical Journal*, November 12, 1910.

**Engelbach: *Interstate Medical Journal*, October, 1910.

†Stein: *Medical Record*, November 5, 1910.

and the injection into the muscles or subcutaneously of a neutral emulsion, is known as Wechselmann's Method.

Last summer, through the kindness of Professor Ehrlich, I was given a supply of the drug for clinical use, and though it is but six weeks since I gave my first injection, which would preclude the possibility of drawing conclusions as to the permanency of the results obtained, there has been sufficient evidence to indicate the wonderful possibilities that obtain with this new preparation. A sufficient number of cases have been observed, not only in my own experience at home, but also while abroad, in the clinics of Wechselmann, Michaelis, Kromayer and others, to make it possible to point out the practical methods of application of the drug, and the phenomena that might be expected to follow its administration.

I believe the drug should not be used in every case of syphilis, particularly just now when its use is still more or less in the experimental stage, and while we are learning the first steps in its use. I have used the drug only in those cases, (1) that would determine its efficiency in certain distinct lesions; (2) where manifest conditions or lesions were present that might be traceable to syphilis; (3) where mercury and iodides have been of no avail; (4) where neither mercury nor iodides have been used. In other words, only such cases that give unmistakable, palpable lesions, were accepted for treatment. This policy gave the drug a distinct problem to meet and overcome in each case. I do not consider the mere presence of a positive Wassermann without lesions, a sufficient reason for administering the treatment.

In considering the treatment of syphilis with the new remedy three questions suggest themselves: 1. Is the new remedy a specific for syphilis, and is it superior to previously known remedies? 2. Does it cure syphilis permanently? 3. Are the dangers of the remedy proportionate to the importance of its action? These questions were first asked in June, 1910, by Wechselmann, to whom Ehrlich entrusted the remedy for trial in his service at the great Rudolf Virchow Hospital, Berlin. I feel safe in saying that our experience of the past six months, with this remedy, making due allowance for the exuberance of enthusiasm for a new therapeutic aid, justifies us in answering these questions with a reasonable degree of optimism.

As to the first question: *Is it a specific in syphilis?*—The answer is to be found in the innumerable cases in which syphilitic lesions have responded to the influence of this remedy in a manner never hitherto seen. Cases that have resisted mercury to the point of salivation and iodides to the point of tolerance, have responded most favorably to this arsenic preparation. I believe that it is a specific in syphilis, though it would be presumptuous to say that it will cure every case of syphilis, any more than we can say that quinine will cure every case of malaria. I have not yet seen a syphilitic lesion that did not show a greater or less response to the drug, and on the other hand, it has often proven the existence of

syphilis in cases where mercury and iodides failed to do so. We thus find the remedy not alone therapeutically efficient, but also uncovering hidden and undiagnosed conditions, dependent upon the presence of syphilitic disease. It is thus apparent that this drug will soon assume an important place as an aid and complement of the Wassermann serum reaction, in the diagnosis of obscure syphilitic conditions. Is it superior to mercury? The cases are too numerous to mention in which it has caused the disappearance of lesions that had resisted mercury and the iodides for years.



Fig. 1. W. S., October 17, 1910. Just before injection of 0.5 gm.

In fact, its most astonishing results are seen in just those cases, particularly tertiary lesions, that have not been influenced by these drugs.

(2) *Does it cure syphilis permanently?*—The future alone can answer this question. Undoubtedly some cases will relapse, but this may be due to insufficient dosage, faulty technique, or some other at present unknown cause, that time itself will reveal. All that can be said thus far, as to permanency, is that by far the greatest proportion of cases that have been treated have stayed well, some of them, almost if not quite a whole year or more, after a single injection. We must wait and see how these cases develop, before we say anything definite as to permanency, but mean-

while there is sufficient evidence at hand that Ehrlich's sole aim,—a *therapia sterilisans magna*, has been accomplished in a large number of cases, as far as present indications show.

(3) *Are the dangers of the remedy proportionate to the importance of its action?*—Here, too, time and further experience must answer. Some 40,000 injections of the remedy have already been made, and as far as I can gather, there have been not more than twelve to fifteen deaths following the treatment. Among this number are some which cannot rightly be ascribed to the drug, but even conceding that they may, the

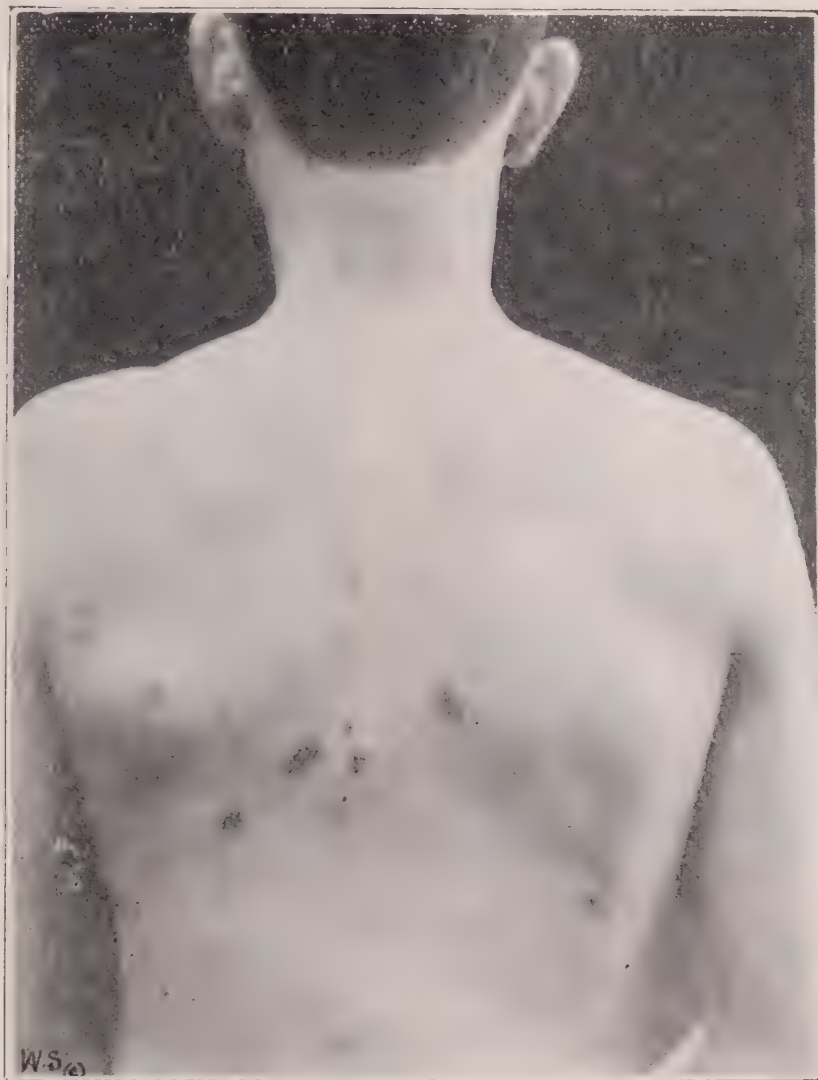


Fig. 4. W. S. Taken October 29, 1910. Twelve days after injection of 0.5 gm.

percentage of serious risk would seem to be very small,—one death to three or four thousand. It stands to reason, there must be some risk attached to the introduction of a remedy that aims at one blow to rid the organism of all its attacking parasites. Ehrlich himself has often stated that any drug that can completely destroy all the parasites in the body at one blow cannot be without some danger. Possibly the endotoxins liberated by the sudden death of these innumerable parasitic bodies, may constitute a risk; possibly also, a maximum of absorption with a minimum of elimination of the drug may have caused these deaths. We must not

forget that a full dose of the remedy contains about three grains of organic arsenic. This amount of arsenic must be taken up by the organism and eliminated after the work is done. Fischer and Hoppe, pioneers in this work, showed that in a patient who received an injection of 0.3 grams (containing 0.12 gm. of organic arsenic), organic arsenic was found in the urine 12 days after the injection, and the amount recovered was 0.0506 gm. In other words, about one-half of the total amount injected. A similar proportion was found in other cases. These data would indicate that about one-half of the amount injected must be eliminated by the kidneys. A smaller percentage is also excreted through the skin and feces. It is thus apparent that if the excretory functions are not adequate to the task of ridding the organism of this excess of arsenic, a storage of the drug may take place in the tissues, and toxic results may



Fig. 2. W. S., October 17, 1910. Just before injection of 0.5 gm.



Fig. 5. W. S., October 29, 1910. Twelve days after injection of 0.5 gm.

follow. Likewise, it seems possible, that an improper technique may introduce septic material or other foreign products, which may act in a manner detrimental to the body-tissues. In short, the greatest risk in the administration of the remedy is to be found in an insufficient excretory function. I am convinced there is no very great risk inherent in the drug itself; in other words, it is not organotropic while it is distinctly parasitotropic, as far as the *spirochetes pallida* are concerned.

Indications for its Use in Practice.—These are summed up by Blaschko as follows:—

- (a) Malignant cases of syphilis which have not reacted to mercury.
- (b) All forms and stages of syphilis in individuals who show an idiosyncrasy towards mercury.
- (c) Cases in which recurrence occurs soon after mercurial treatment.

(d) Cases in which recurrence occurs while the patient is taking mercury.

(e) Primary lesions before the appearance of secondaries.

(f) Constitutional syphilis not hitherto treated in the primary or secondary stages.

(g) In late recurring secondary lesions it should be used in combination with mercury and iodides.

(h) In parasyphilitic affections of the cardio-vascular and nervous systems, it should be used only in the early stages.

Ehrlich recommends that primary lesions should be treated as early as possible, before the appearance of secondaries, adding that energetic

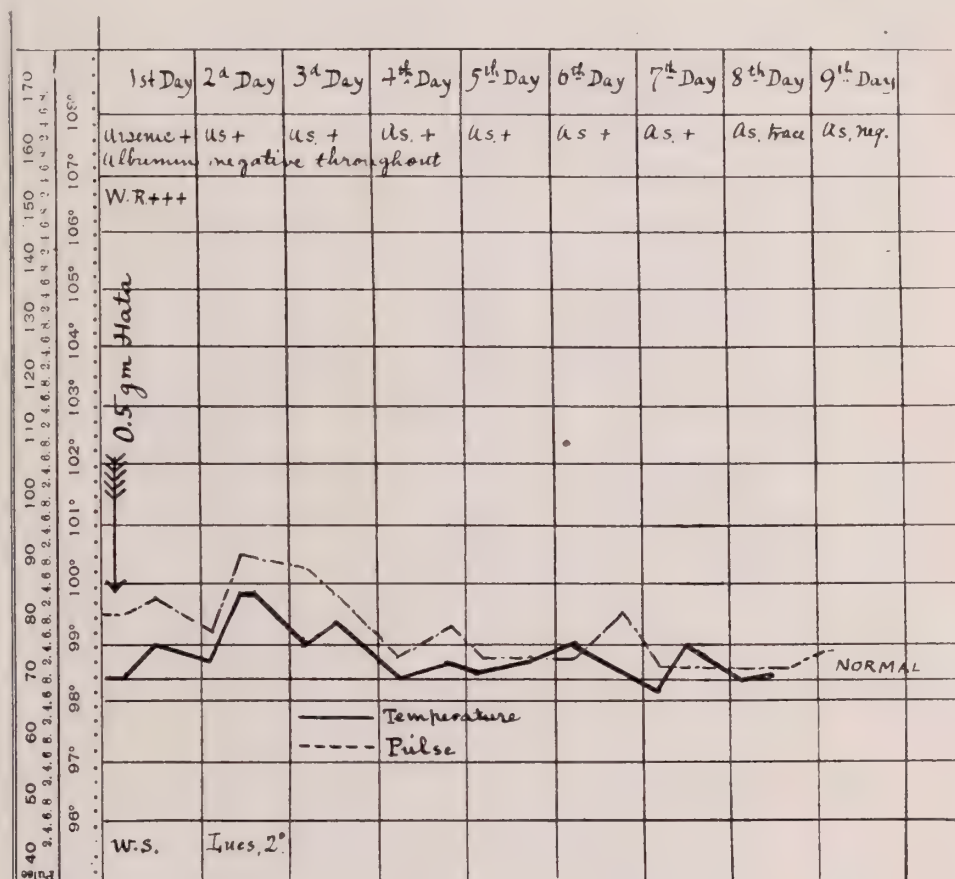


Fig. 3.

local treatment should be employed, to aid in causing complete sterilization, such as excision, cauterization and other methods of destruction.

Contraindications against its use:—

- Advanced disease of the nervous system, and general debility.
- Distinct lesions of the cardio-vascular and renal functions.
- The existence of an idiosyncrasy towards arsenic.
- Pregnant women seem to tolerate the drug well, but in some instances abortion seems to have been caused by it.

It should be noted in this connection, that the presence of albumin and casts in the urine, in small quantity, is not a contraindication, *per se*. Cases have been reported in which a persistent albuminuria with casts has been cleared up after the injection, and on the other hand a specific

albuminuria with or without casts will nearly always disappear under this treatment.

Technique.—From personal observation and experience, I believe that the method of Alt (alkaline solution) mentioned above, is the simplest to carry out, and is perhaps the most effective. I have used it in all my cases, numbering about thirty-five, with satisfactory results. It is as follows* :—

With a glass pipette, 10 c.c. of hot distilled water are put into a glass mortar, having a capacity of 50 c.c.; to this is added the arsenolbenzol a little at a time, constantly stirring it with a pestle, until it is thoroughly dissolved. We now have a clear, amber colored solution, strongly acid. With another pipette, we add a four per cent. solution of sodium hydrate in sterile distilled water, about 0.5 c.c. of the solution for each decigramme of powder used, constantly stirring with the pestle. Now a thick gelatinous mass forms, in which the substance is precipitated; but by continuing to add the sodium hydrate solution, drop by drop, the precipitate disappears and another solution, quite clear, is now formed. This solution is very strongly alkaline, and if thus injected causes much pain. In order to diminish the alkalinity, and make the solution nearly neutral (and consequently painless), we add, drop by drop, through a third pipette, a one per cent. solution of acetic acid (in sterile water), constantly testing with litmus paper. When the alkalinity is reduced to a minimum, sufficient distilled water is added to make 20 c.c., and of this solution, 10 c.c. is injected into each buttock. A piece of sterile gauze is now placed over the site of the injection and held in place with two strips of adhesive plaster, forming an X. The patient should lie face downward for about half an hour, and should then be put to bed and kept there for a day or two. He should now be kept under careful observation, for at least one week, preferably a fortnight, in the hospital or at home.

Certain precautions are absolutely necessary and should never be omitted. All the apparatus used for the injection should be thoroughly sterilized in the same manner as surgical instruments before operation. This includes the mortar and pestle, the syringe and needle, the pipettes, and even the steel file with which the neck of the glass vial containing the powder is cut across. The neck of the vial should be cleansed with alcohol and ether. The skin of the buttocks should be thoroughly cleansed and rubbed with ether until it is red, immediately before the injection. This helps to anesthetize the skin and renders the injection less painful.

Another very important precaution to be observed is that the solution should be made up immediately before it is to be used, at the bedside of the patient. The best results are obtained only when the solution is absolutely fresh and sterile.

The operator should wash his hands carefully, and wear a sterile gown. The needle employed should be fairly large in calibre, similar to the one used in the injection of the insoluble mercury preparations. A Record syringe with a capacity of 20 c.c. is the ideal instrument for this purpose. Care should also be taken not to inject the fluid into a vein or an artery.

Preliminary Examination Previous to Treatment.—In every case I have had a thorough examination made of the lungs, heart, arteries, and abdominal organs. The eyes have been carefully examined, especially the fundus; I have been informed by Alt and Wechselmann (personal com-

*Wolbarst: *New York Medical Journal*, November 12, 1910.

munications), who have used the drug in thousands of cases, that they have never seen any ocular complications, even in cases of optic atrophy. A Wassermann test is made in every case, and if a skin lesion is present,



Fig. 6.

an examination for spirochetes is made. Especial attention is paid to the urine, as the presence of sugar, albumin and casts in large quantity, is a contra-indication to the use of the drug.

Phenomena Following the Injection.—Certain phenomena stand out prominently in all cases after the injection, and it is well that they should be anticipated.

1. There is usually a distinct rise of temperature. The average rise is up to 101° F., but 102° is not unusual, and one of the cases mentioned below showed a temperature of 105.4° F.

2. The pulse does not vary much from the normal.

3. Whatever pain the patients may have, they usually eat well, feel good and do not at any time "look sick." The temperature is not that of a febrile disease.

4. In the gluteal injection, the buttocks will often feel "sore" for a number of days after the injection. Sitting on a chair is a painful operation. I have observed, however, that necessity devises a way of obviating this inconvenience. The patients sit astride the chair, facing the back, with a pillow or cushion on the seat. This seems to make the process a painless one.

5. It is interesting to note the gain in weight in most of these patients. The rate of gain is about a pound a day, in the average case.

6. Patients with tabes dorsalis seem to be insensitive to the injection itself. However, their accustomed pains in the legs often appear some time after the injection.

Perhaps the best way to illustrate these phenomena, is to report in full several cases, each of them representing a distinct set of phenomena and symptoms. Particular attention was paid in every case to the temperature and pulse, the excretion of arsenic and albumin in the urine, the weight of the patient, and the condition of the eyes. In a few instances, some particular detail was omitted through the inability of the house staff to carry it out, at the time. The period of observation in the hospital, ranged from ten days to two weeks; thereafter the patients were seen twice weekly, to date, wherever possible.

CASE I. *Secondary Syphilis Rebellious to Mercury and Iodides.*—W. S., male, aged twenty-three, referred by Dr. E. M. Hawks. Previous history negative. Initial lesion on penis in May, 1910. Roseola appeared on body last week in June. Macules slowly changed to pustules, and were not influenced by treatment. Condition, October 1st, 1910, pustules on back, ranging in size from a dime to a quarter; have slowly dried, and become scaly (Fig. 1). Mucous patches on tongue since July; have remained and become ulcerous. Slough over both tonsils during August and September. Left iritis since September 15th. Ulceration on great toe (Fig. 2) since early in September. Nail removed October 14th. He has lost much flesh and strength.

Treatment: Hydrarg. succinamid. gr. 1/5, three times weekly, by hypo; 15 injections; no result. Salivated first two weeks in August. Last two weeks in August, protoiodid of hydrarg, gr. 1/3 per mouth; salivated again. Inunctions since September 7th. 15 (30 grains), 8 (40 grains); also KI. No effect. October 16th, Wassermann Reaction + + + +.

October 17th, received 0.5 gm. Arsenobenzol; Alt method. Pain moderate, radiating principally down the thighs, and controlled by hot water bag on but-

tocks. Reaction not marked (see temperature chart, Fig. 3). Uneventful stay in hospital; up and about on the second day. Temperature highest on second day (99.8° F.). No infiltration nor redness at site of injection. Tender on pressure.

Examination of eyes, by Dr. M. Rosenbaum: "October 24th, syphilitic iritis of left eye; slight circumcorneal injection, posterior synechiæ, cloudiness of vitreous.

October 28th: Cloudiness of vitreous disappeared, iritis not present; posterior synechiæ fading. Right eye normal; left eye, vision 12/70 with atropin.

November 3d: Both eyes normal."

Discharged from hospital October 29th. Skin lesions but faintly visible; pink spots on back. Scaling all disappeared. Great toe granulating. (Figs. 4 and 5).

November 18th: Eyes normal; skin still shows pink areas where the ulcers formerly were. Patient has gained nearly fourteen pounds. Big toe nearly well, with new nail rapidly coming out.

December 13th: Skin clear; toe practically well; eyes normal. Wassermann reaction + +.

A study of the temperature chart (Fig. 3) will point out several features of this case. The temperature curve, indicates that the reaction was not a severe one; usually the temperature reaches 101° or 102° on the second day, but in this case it did not rise above 99.8° F. The pulse acted in harmony, and did not pass 90 per minute. Arsenic was found in the urine within eight hours after the injection, and could be determined daily eight days thereafter. On the ninth day none could be observed. Albumin was absent throughout. The Wassermann reaction, 57 days after the injection, is still positive.

CASE II. Malignant Secondary Syphilis, Resisting Mercury and Iodides.—J. L., male, aged twenty-eight, referred by Dr. J. B. Prager. Initial infection eighteen months ago, on the penis. Began as a pustule, which grew large and hard and eventually broke down, resisting treatment for seven months. Inguinal glands swollen and tender. Six weeks later, the roseola appeared and disappeared only after several months of treatment. For the past three months the patient complains of a sore throat, growing worse all the time, so that it interferes with his speech and renders swallowing difficult and painful. Has also had pains in the joints.

Examination of the eyes, heart, lungs and kidneys negative. Wassermann reaction + + + +.

Examination of the throat revealed a large greenish white, ulcerating area covering the uvula, tonsils, post-pharyngeal space, and part of roof of the mouth (Fig. 6). The mouth could be opened only with difficulty.

November 3rd, 1910. Injected 0.5 gm., Hyperideal. Alt method. No pain at time of injection, but a few hours later, pain of moderate severity over the site of injection which lasted two days. Throat was cleansed with saline solution.

November 5th, improvement noted. Green ulceration turning paler and assuming a brownish color. Throat feels better, swallowing and speech easier.

November 10th, improvement continuous. Full diet. Out of bed and feels better in every way. Ulcerated area assuming normal color. No infiltration nor redness at site of injection.

November 15th, left the hospital feeling perfectly well, though the throat still showed some signs of the recent ulceration.

November 20th, throat normal.

November 25th, throat normal, and patient back to work. Gained seven pounds. Has not returned for further observation.

In this case the typical temperature reaction is observed (Fig. 7). The temperature reached 102° on the second day, the pulse going up to 112. Then a decline followed. During the reaction, the patient did not look sick. This is a peculiarity of this metabolic reaction to the drug. Arsenic was found in the urine for five days after the injection. Albumin was negative except on the second and third days after the injection. The quantity of urine passed was normal throughout. The eyes showed no changes at any time.

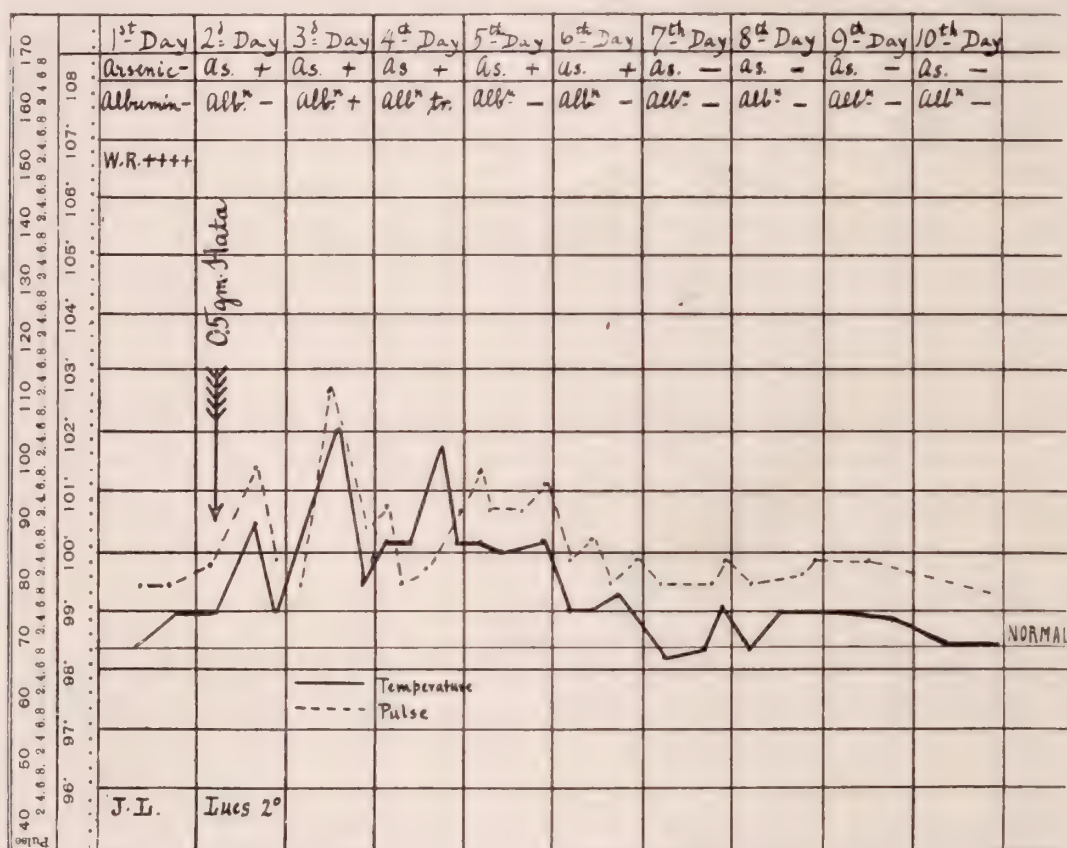


Fig. 7.

CASE III. *Primary Affection*.—R. E., male, aged twenty-seven, referred by Dr. S. W. Bandler. Good general health. Initial lesion on shaft of penis, near corona, hard and typical in appearance, the size of a quarter. Duration two weeks. No secondaries. Inguinal glands indurated, not tender. Other glands negative.

November 4th: Examination for spirochetes, *positive*. Wassermann reaction, *negative*. Acting on the suggestion of Ehrlich, that these initial cases be treated as early as possible, preferably with excision of the lesion, an injection of 0.5 gm. Hyperideal was given November 7th, 1910. Excision was suggested, but not permitted. To avoid any possible doubt as to the character of the lesion (in the absence of secondaries) patient was also examined by Dr. Ludwig Weiss, who confirmed the diagnosis. Examination of eyes, visceral organs and urine, *negative*.

November 7th, 0.5 gm. Hyperideal. At method. Pain moderate, but in a few hours it extended down the thighs, and remained there for several days. Controlled somewhat by hot applications, and gr. $\frac{1}{4}$ morph. at bedtime. In the

afternoon the temperature rose suddenly to 102° F. Pulse 76. A study of the temperature curve (Fig. VIII.), shows an unusually active response to the drug.

1st day, 99.5° to 102.0°; pulse 64 to 76.
 2d day, 97.0° to 101.8°; pulse 68 to 80.
 3d day, 100.1° to 102.6°; pulse 68 to 100.
 4th day, 100.6° to 102.0°; pulse 98 to 100.
 5th day, 102.0° to 101.0°; pulse 96 to 92.
 6th day, 101.2° to 103.0°; pulse 92 to 96.
 7th day, 103.0° to 104.5°; pulse 90 to 102.
 8th day, 104.5° to 105.4°; pulse 90 to 102.
 9th day, 105.4° to 103.8°; pulse 100 to 95.
 10th day, 103.8° to 103.2°; pulse 95 to 90.
 11th day, 103.2° to 100.8°; pulse 90 to 85.
 12th day, 100.8° to 99.0°; pulse 85 to 72.
 13th day, 99.0° to 98.2°; pulse 72 to 70.
 14th day, Normal. Normal.

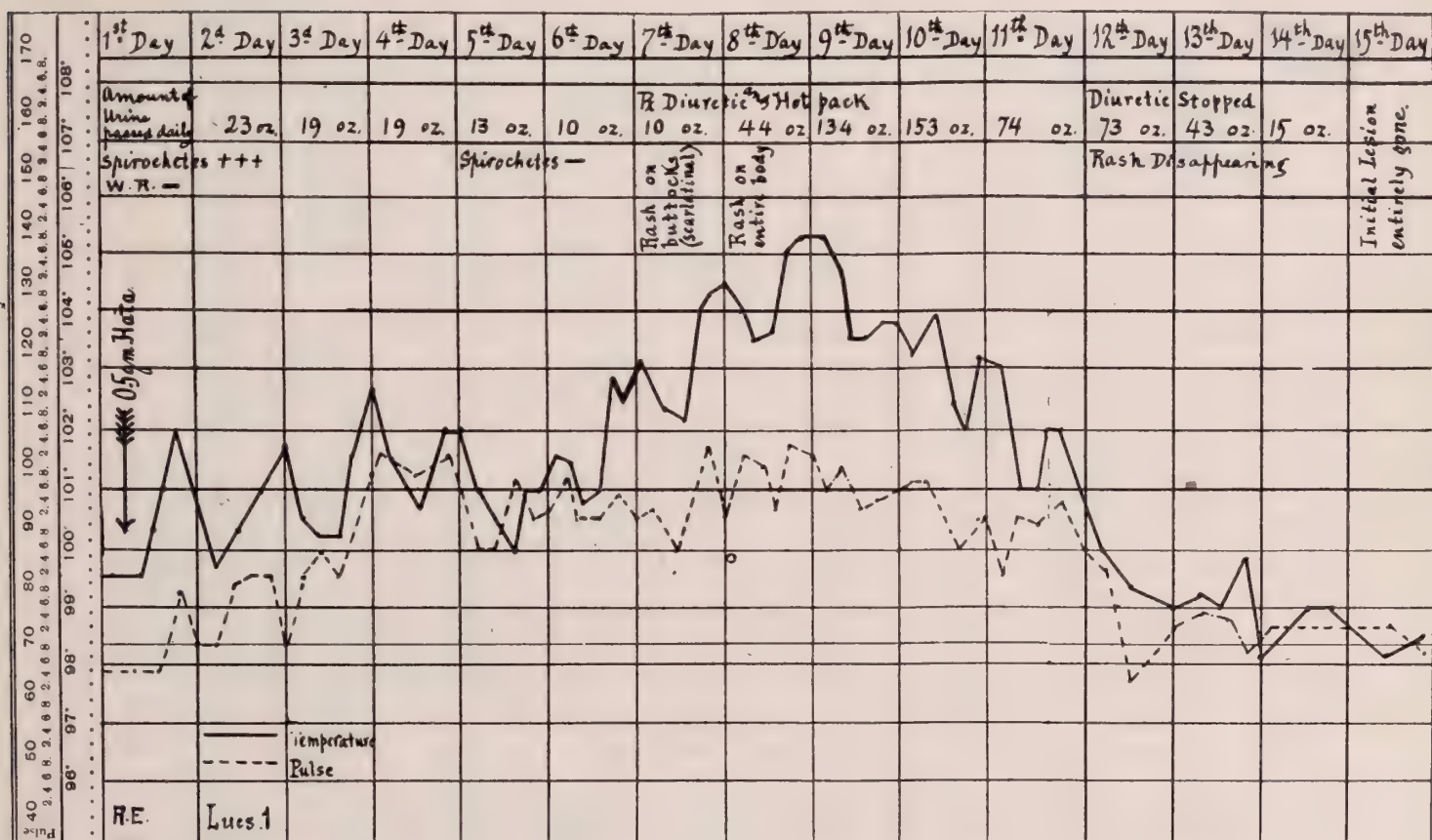


Fig. 8.

Interesting features of this case that are unusual, are the very high temperature, partial suppression of urine, and coincident appearance of a generalized scarlatinal rash. The amount of urine passed on each day after the injection is as follows:

1st day, amount not counted.
 2d day, 23 ounces.
 3d day, 19 ounces.
 4th day, 19 ounces.
 5th day, 13 ounces.
 6th day, 10 ounces.
 7th day, 10 ounces. Rash on buttocks (diuretic given).

8th day, 44 ounces. Rash on entire body, scarlatinal.
 9th day, 134 ounces.
 10th day, 153 ounces.
 11th day, 74 ounces. Rash disappearing.
 12th day, 73 ounces. Diuretic stopped.
 13th day, 43 ounces.
 14th day, 15 ounces.

The rash appeared coincidentally with the high temperature and urinary suppression; it first appeared on the buttocks (site of injection) and soon spread to the rest of the body, including the face; the urinary condition was relieved by a strong diuretic and hot packs, with plenty of water internally. During all this time the patient did not feel unwell in the least, except for the pains in the legs, and in the arms. These were somewhat relieved by alcoholic rubs. There seemed to be a neuritis, possibly of arsenic character. The patient was rather dull and slept a good deal. Otherwise felt well. The tongue was coated with a yellowish white, thick, slimy fur, which I have only seen in similar cases with high temperatures. Unfortunately at the time there were no arrangements for the examination of the urine for arsenic. However, there can be no doubt that the entire complex of symptoms was due to faulty elimination of the drug, or hypersensitiveness (idiosyncrasy) to the drug, or both.

November 11th. Spirochetes negative. Chancre soft and fast disappearing; glands negative. No infiltration or redness at the site of injection.

November 15th, discharged from hospital. Primary lesion gone, except a slight pinkish discoloration of the skin and slight thickening.

November 30th, Wassermann reaction + + +. Skin clear, glands negative, patient has gained about ten pounds. Eyes normal.

December 4th, Wasserman reaction + +; skin clear, patient normal and feels well.

CASE IV. *Tabes Dorsalis, Optic Atrophy (partial). Gastric Crises. Marked Ataxia.*—J. M., male, aged thirty-six. Denies venereal history of any kind. First symptom of illness appeared six years ago, in the form of gastric pains, accompanied by occasional attacks of vomiting. Was treated for gastric disease until six months ago, when the diagnosis of tabes dorsalis was made by Dr. George J. Saylin, of Buffalo, N. Y. These symptoms were then present: Absence of knee-jerk, marked ataxic gait, Romberg symptom, Argyll Robertson pupil, gastric crises with vomiting, shooting and lightning pains in legs. Optic atrophy, loss of flesh and strength. Wassermann reaction strongly positive. Urine negative as to sugar and albumin. Was put under treatment consisting of injections of salicylate of mercury and arsenic. Strychnin internally for the optic atrophy.

October 21, 1910. Marked ataxia, necessitating use of two canes and other support. Stumbles in the dark. All diagnostic symptoms of tabes marked and unmistakable. Eyes examined by Dr. E. Gruening: "O. D. 3/100; O. S. 3/200. Both normal fields concentrically limited. Absolute color blindness. Optic atrophy."

Examination of viscera, heart, lungs and kidneys, normal. Pulse 96, not very strong. Wassermann reaction + + + +.

At the earnest solicitation of the patient, and his assuming all liability as to the outcome, he was admitted to the hospital.

October 24, 1910. Injected 0.5 gm. arsenobenzol. Alt method. No pain whatever at the site of injection, during his entire stay in hospital. Six hours after injection, pain appeared in the legs and around the chest. These did not differ in any way from his accustomed pains. Vomiting also set in on the second day, and continued for three days, after which period it ceased. Like-

wise the pains. The pain and vomiting did not differ in any way from his accustomed crises.

October 28th, out of bed, in ward. Walks without a cane. Thinks his gait is less ataxic. With his eyes closed sways much less than previously. Pain absent. Eyesight not as good as before. Examination by Dr. Rosenbaum: "Atrophy somewhat advanced. Vision diminished. O. D. Fingers at five feet; O. S. Fingers at three feet. Previous to injection, O. D. Fingers at seven feet; O. S. Fingers at five feet." No infiltration or redness at the site of injection.

The temperature chart shows an unusual curve (Fig. 9). It will be seen that the patient reacted slightly on the day of the injection, by a lowering of the temperature to 98°, and on the third day there was a still further decline to 97° F. This decline was soon changed to a slight elevation, never exceeding

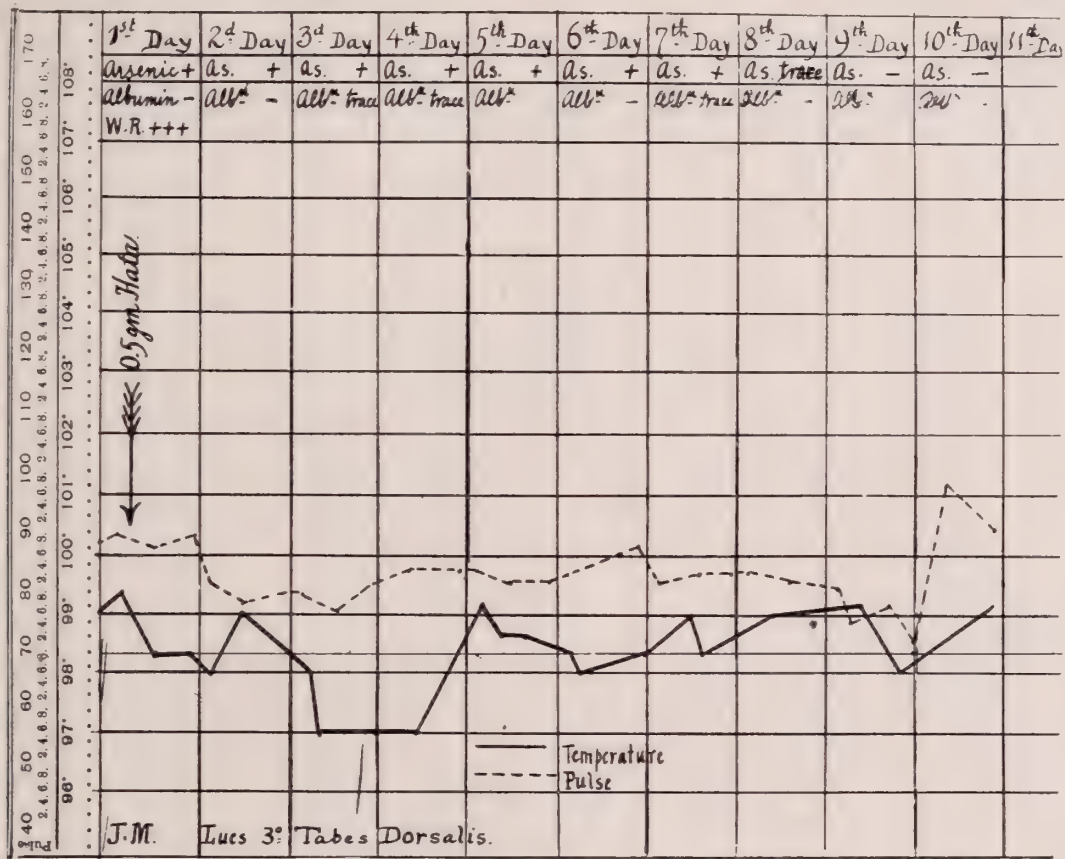


Fig. 9.

99.5°. It will be seen that the pulse did not share in the great lowering of the temperature. Arsenic was found in the urine eight days after the injection.

November 2, 1910, he left the hospital, under protest, feeling very well, except for his sight. He walked easily without a cane, though he showed a distinct ataxic gait. Gain in weight, four pounds.

November 16, came to office for observation. Walked without a cane. Felt much better.

December 3rd. Communication from his physician, Dr. Saylin, states: "Despite progressiveness of optic atrophy, gait and general condition show improvement. Patient is inherently hysteroneurasthenic,—yet, after careful observation, I can say that his condition has improved markedly, except his vision."

December 13th. Communication from Dr. Saylin, as follows: Wassermann reaction, December 10th, taken by Dr. A. A. Thibaudeau, is positive, but less strongly so than formerly.

As regards the physical aspects of the case, I can but reiterate that there is a positive improvement. His gait is rather that of a blind man than that of a

tabetic. Romberg's symptom, which was marked three months ago, is but slightly so now. He has gained in weight and complains less of weakness in his lower extremities and of the "carpet" sensation. Vesical atony which was characteristic in his case, also shows improvement. However, he states positively that his sight became worse and became markedly so shortly after the administration of "606." Tests prove him right, and this raises a question as to future procedure.

It will thus be seen that this patient has improved, as far as his gait and general condition are concerned, but the progress of his optic atrophy has apparently not been stopped. This is quite contrary to the general behavior of similar cases after the injection. In many thousands of cases examined by Fehr for Wechselmann (Berlin), there was no deterioration of sight after injection, even in cases of optic atrophy. The question to be determined in this case, is whether the deterioration in vision was hastened by the injection, or whether it would have occurred even without the injection. At any rate, the treatment, apparently was unable to stop its progress, though it benefited the patient in other respects.

CASE V. *Lues 3°.* *Cerebral Syphilis.*—A. A., aged twenty-nine, referred by Dr. C. A. Spivacke. Father died of tuberculosis, mother still living, affected with diabetes. Patient has had several attacks of urethritis.

Primary affection in 1905. Was treated for about six months with mercurial injections. No history of sore throat, alopecia, or pains in head. A year later the right elbow became painful and swelled a great deal. The pain was dull in character and so severe at night as to keep him awake. This condition improved under treatment.

Eighteen months ago patient suffered an attack of right hemiplegia while under the influence of alcohol. The right arm, leg and right side of face were affected. In bed several weeks. Also suffered slight illusions at the time. He improved under a course of iodides, but felt very depressed and lost all ambition for work or play. The right elbow remained swollen and tender. Has been under treatment for some time at the Vanderbilt clinic.

I saw him first October 26, 1910. He was dull and apathetic, unable to do his work (bartender), losing one position after another. His face had a constant smiling, childish appearance. Had no illusions, but realized that he was not well and wanted to do anything that might enable him to go back to work to support his mother.

Physical examination as to viscera, heart and arteries, and urine, normal. The right elbow joint measured 11 inches in circumference, the left $10\frac{1}{4}$ inches. Eyes normal, except for a slight cloudy deposit on the anterior surface of lens of left eye, in upper right quadrant. Wassermann reaction + +.

November 3, 1910. Injected 0.5 gm. Arsenobenzol, Alt method. Slight pain, which passed off next day. Temperature reaction quite active (see Fig. 10). Never higher than 102° on the third day. Pulse varied from 70 to 94. Stay in hospital uneventful. Was out of bed most of the time. Improved markedly after the fourth day. His mind brightened up perceptibly, he took a greater interest in things about him, and expressed a strong desire to go home and back to work. He felt strong and able to do anything. No infiltration or tenderness at the site of injection.

November 8th, at my request he wrote me a letter describing his condition. It is full of hope and optimism; in fact, it gives every evidence of being written by a man who has awakened out of a stupor and sees the light of day.

November 15th. Sent home. Much improved. His arm does not pain any more and there is but a slight difference in the measurement of the elbows. His mind is active and bright, and his mother feels that he is brighter than he has ever been.

Arsenic was found in the urine eight days after the injection, albumin negative throughout.

December 1st. Condition highly satisfactory in all respects. Wassermann reaction + + +. Eyes normal.

It is hoped that these five cases will suggest the possibilities of the new remedy in syphilis and its allied conditions. Time and space forbid a complete report at this time of some of the other cases in this series, most of which are of unusual interest.

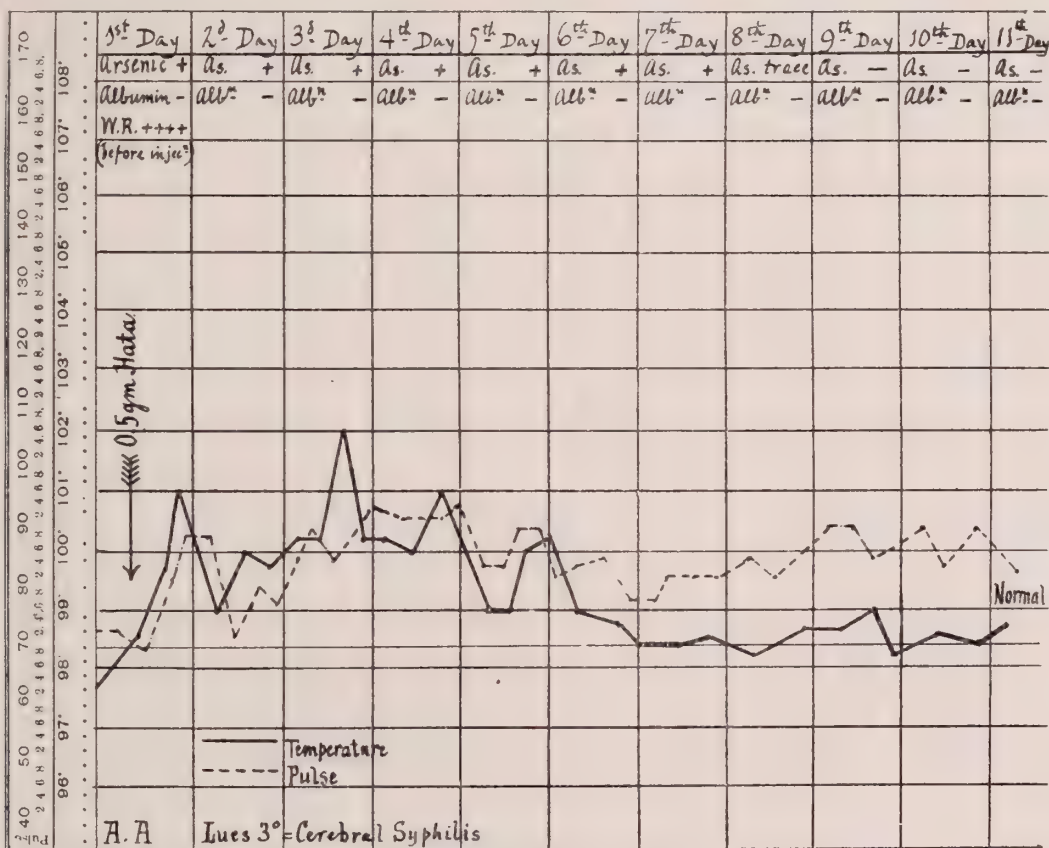


Fig. 10.

I consider this a most opportune moment to repeat a note of warning to all who are about to begin the use of this powerful remedy, as soon as it is given to the public. Certain precautions must be insisted upon:

1. No one should attempt to administer the treatment unless he has seen it given by another, more experienced. Faulty technique may cause a fatal result.

2. The remedy should not be administered to ambulant patients. Ehrlich also insists on this point, and all experience confirms the correctness of his view.

3. It should be administered only in a hospital, or sanitarium where the most careful asepsis can be observed, and where a thorough watch can be kept on the patient's condition at all times. In a private home,

with a trained nurse in charge and a physician within easy reach, it can also be given with safety. The patient should be seen every day.

4. The urine should be examined every day as to quantity, specific gravity, and as to the presence of albumin and arsenic.

5. The patient should be kept thus under close observation for at least ten days, and preferably two weeks. It is a common experience that once the patient is permitted to leave the hospital, he seldom returns for further observation.

6. We should not for one moment forget that we are dealing with a product capable of producing toxic effects, and that patients vary in their susceptibility to this and other poisons.

Briefly, we may conclude that the remedy gives evidence of being able to combat successfully conditions that remain unaffected by mercury and iodides for months and years; that while it is wonderfully effective, it must be used cautiously; certain persons show a susceptibility towards the drug, with the result that alarming symptoms may arise; these alarming symptoms disappear as soon as elimination is augmented; at no time do the patients give evidence of being "sick," even when the temperature runs above 105° F. The high temperature is due to the reaction of metabolism, caused by the absorption of the arsenic. Lastly, we have added to our therapeutics, through the immortal genius of Ehrlich, the most powerful weapon in the fight against syphilis, that civilization has ever known.

I desire to express my thanks to the members of the House Staff of the People's Hospital, for their courteous coöperation in making the daily urine examinations in all of these cases (except case III.), and in many others, which will be published at a later date. Likewise to Dr. I. M. Rottenberg and Dr. M. Rosenbaum of the Visiting Staff, for their special examinations before the treatment was administered and during the patient's stay in the hospital. Examinations for spirochetes were made by Dr. Walter J. Heimann, and the Wassermann tests were made in the laboratory of Dr. N. Kruskal.

105 East Nineteenth Street.

RECENT PROGRESS IN THE TREATMENT OF SYPHILIS.

By H. HALLOPEAU, M. D., of Paris, France,
Member of the Academy of Medicine.

To begin with, I shall describe step by step the curative and abortive treatment of syphilis.

Progress in Curative Treatment.—The introduction of new arsenical preparations in the therapy of syphilis was a decided advance as regards progress. In 1907 Salmon used the preparation popularly known as atoxyl, but which is in reality paraminophenylarsinate of soda, and contains 31 per cent. of arsenic. Prior to 1907, it had been proved that atoxyl had a decided action on the trypanosomes of sleeping sickness, and bearing this knowledge in mind, Salmon arrived at the opinion that it might be equally efficacious in destroying the treponemæ of syphilis. In a communication to the Biological Society, Salmon announced the results of his first attempts with atoxyl as a curative agent. The results were most encouraging, for when this medicine was administered in large hypodermic doses, it was very well tolerated and in a few days the syphilitic manifestations disappeared. Numerous cases of syphilis had been treated at the St. Louis Hospital by six injections of 0.5 gm. each. The disturbances following the injections were digestive, and though these were intense their duration was short. A number of Salmon's confrères were not so successful as he in the use of this new arsenical preparation, and to-day the record shows that 27 cases of blindness were produced by atoxyl. This untoward occurrence caused physicians to decrease the dose, and in one case ten consecutive injections of 0.05 gm. each caused blindness. Hence, the conclusion must be drawn that atoxyl contains a high degree of toxicity.

Prof. Ehrlich, after the unfortunate experiences of physicians with atoxyl, thought he had discovered a product that would have happier results. This product was called by Ehrlich arsacetine (acetyl paraaminophenylarsinate of soda) and contained 26 per cent. of arsenic. The dosage was twelve doses of 0.6 gm. each at intervals of four days, and on account of the smaller proportion of arsenic, it was hoped that there would be a diminution in the toxic action. This preparation was extensively employed in large doses in various hospitals throughout Germany, and its therapeutic action was approximately the same as was that of atoxyl, though it was believed for many months that this new preparation was an active and an inoffensive remedy for syphilis. Again the record read that many patients became suddenly blind after one injection;

hence, arsacetine must be classed with atoxyl as a preparation that is so toxic that it would be criminal not to abandon it at once.

Will the results be more fortunate from the use of the Ehrlich-Hata preparation known as "606?" This preparation (dioxydiamidoarsenobenzol) contains 41 per cent. of arsenic and should be administered in doses from 0.5 to 0.6 gm. It is claimed that all the direct manifestations of syphilis are so decidedly affected, that its action is incomparably greater than that of any other therapeutic agent; that in a few days papules disappear, ulcers cicatrize and gummata recede; that it is an infallible destroyer of *treponemæ*; that its effects are lasting, though at times it is necessary to give a second injection after some weeks; and furthermore, it is claimed that the problem of the cure of syphilis is solved.

Already, though this preparation has been in use only some weeks, a number of regrettable facts can be registered against its use. I do not mean by this the intense pain that is caused by intramuscular injections; an inconvenience such as this should not weigh much in the face of important results. But what I do mean are the lack of simplicity in preparing "606" before its use, and its alterations which occur rapidly; hence the necessity of making a fresh solution immediately before the injection. The procedure is as follows: In a graduate, previously sterilized, 50 c.c. are mixed with a few drops of methyl alcohol, to this 10 c.c. of distilled water are added, then slowly from 0.02 to 0.03 gm. of a soda wash are added until 0.1 gm. has been used, and finally 20 c.c. of sterilized water are used. The temperature is lowered by neutralizing the liquid with about 2 c.c. of a 1 per cent. acetic acid solution. All this takes up one hour, but despite the length of time in preparing the solution, this fact may be overlooked as well as the painful local reaction which is troublesome enough at times. The important matter, however, is the general condition of the patient after an injection, since this is weighty enough to be considered a serious impediment to the use of this new preparation. The disturbances are vomiting with profound depression, occasional disappearance of the patellar reflexes, retention of urine, paralysis of the lower limbs; and finally it may be recorded that a number of deaths have followed the injections.

Should these be considered but mere coincidences, as affirmed by the defenders of this new preparation? To begin with there should be mentioned the deaths of three out of five children to whom Wechselmann administered "606." Here we have undoubtedly the relation of cause and effect; hence, if this medicine produces in the young child such grave disorders that death results, it must be admitted that its action on the adult cannot be other than toxic. Moreover, there is to remember that it may engender in the organism latent disturbances that must be seriously considered; therefore all those patients who have submitted to this treatment should be watched with the greatest care during many weeks. The

probability of alterations in various organs should be a contraindication against repeated injections in the same patient.

It has been claimed that on account of the large dose of "606" all recurrences should be excluded as a certainty. Yet, in spite of this assertion, there have been 10 per cent. recurrences in all the cases, though only a short time has elapsed since the introduction of this new treatment. When one remembers the remarkable faculty that the treponemæ of syphilis have as regards latency, one cannot but consider the assertions, which have been made in certain quarters as to complete cures, as decidedly premature. Moreover, where recurrences take place after so short a time as has been evidenced in this treatment, the physician should not be forgetful of the occurrence of grave deuteropathies of the nerve centres, blood-vessels, viscera, and bone-tissues. Hence can it be said in all fairness that we are in possession of an agent that is definitely curative of syphilis?

Benzosulfoneparaaminophenylarsinate of soda, introduced into therapeutics by Mouneyrat, more than a year before the discovery of "606," and which is known by the name of hectine, is free from all dangers. Observations made by Balzès and Milian, as well as by myself, have resulted in convincing me that in a moderate dose of 0.2 grm. a day, repeated regularly during three or four weeks, this remedy is efficacious for those manifestations of syphilis which have resisted the action of mercury. Of such cases one of Gaucher's patients showed the remarkable effects of hectine. Intolerance is unknown; and, on account of this, Milian at the present moment is making researches to ascertain whether the dose of hectine can be increased with safety to the patient, so that a therapeutic action comparable to that of "606" may be achieved. The result of these facts indicates that we are progressing towards finding a cure for acquired syphilis, and that having abandoned atoxyl and arsacetine, the near future must decide between hectine and "606."

Progress in Abortive Treatment.—In this connection no doubts remain in my mind. The time which has elapsed since I made my first experiments—twenty-two months for one and fifteen months for the other two—has convinced me that appropriate local treatment of the chancre, instituted within thirty days of its appearance, prevents a patient from having any secondary manifestations. I, myself, have carefully studied fourteen cases, and to these should be added those of Fouquet, Guiard, Maisonneuve, Mariotti, and Moniez. This treatment by hectine is the outcome of a new interpretation of the primary lesions. According to my observation the clinical facts have shown that syphilis is not, as is usually thought, a general infection from the time of the appearance of the chancre, but a local infection limited to the area in which the chancre is situated, to the tissues which surround it, and to the lymphatics. This localization lasts throughout the forty-two days of incubation. If during this time any treponemæ penetrate into the general circulation, their number is very small, and, moreover, their virulent activity is decidedly feeble.

Hence a thorough local treatment ought to be the right thing in this disease, and ought to be able to nip it in the bud: surmises which have been verified as truisms in my practice.

I employ hectine in the daily dose of 0.2 gm., dissolved in 1 c.c. of sterilized water. In case the chancre is penile, the needle is introduced, the first two or three times, into the tissues immediately contiguous to the chancre. This produces at once a slight elevation, which, however, disappears at the end of twenty-four hours. The pain which occurs after the first injections is quite severe, but can be abated by cold applications or cold local bathing. The later injections are not followed by this untoward symptom, as the tissues become accustomed to this sort of interference. Thirty days later the injections are repeated.

Fouquet, who treated two patients by giving injections of hectine, reports that both were cured, one after five, and the other after eight injections. In one of my own cases in the Municipal Hospital of Nanterre, fifteen injections prevented the appearance of secondary manifestations. Thus if a larger number of injections are given, it is merely done to make the success of this medication more complete. The chancre is cured by hectine in a few days, the lymphatic glands resume their normal size; but what should be specially emphasized is that secondary manifestations do not appear. The Wassermann reaction is generally negative shortly after this treatment has been instituted, but at times it is necessary to wait for this result until several months have elapsed. In women the needle is introduced into the cutaneous border of the labium majorum and then pushed in beyond the mucous membrane.

I employ exclusively hectine, since the only mercurial preparation, which is well tolerated in connection with this medication, is the oxycyanide, which has been given by Mariotti with good results in doses of 0.002 gm. On the other hand, Moniez has used atoxyl without any bad results; however, to generalize the use of this arsenical preparation would be inadvisable.

The therapeutic method which is advocated in this paper is an abortive one, since there results a complete destruction of the treponemæ in the initial lesion. To reach the few treponemæ, which get into the circulation before the chancre is healed, I advocate adding to the local treatment twenty subcutaneous gluteal injections of 2 c.c. each of a 1 per cent. benzoate of mercury, according to Gaucher's formula. The success of hectine is invariable, and up to the present time no case of failure has been recorded. The persistence of a positive Wassermann reaction in certain cases is of no great moment as an indication of the presence of treponemæ, as I have seen it negative at the end of some months in cases in which the treatment was not repeated.

Local treatment by means of "606" is out of the question, since the dose is altogether too large to be injected around a chancre; hence, hectine is to be preferred, for it can be used locally and is never followed by secondary symptoms. If hectine were more generally used there would be no need of "606," because there would no longer be treponemæ in the organism.

GIANT CELLS IN SYPHILIS.

By JOHN A. FORDYCE, M. D., of New York,
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Medical College, New York.

According to our cytological classification multinucleate structures of both physiological and pathological origin are included under the term giant cell. A discussion in extenso of the various theories relative to the formation and function of these bodies is beyond the scope of this paper, the chief aim of which is to demonstrate that the majority if not all of the giant cells met with in cutaneous syphilis owe their origin to vascular changes.

To recapitulate some of the more prominent views on the formation of giant cells in general, it is held (1) that they are produced by the coalescence of several cells; (2) that they result from nuclear division of one or more cells, and (3) that they owe their origin to transformed vessels. To differentiate between the types arising from cell division and those resulting from cell fusion, the term syncytium is often limited to the structures arising from multiplication of nuclei without subsequent division of cell body, while plasmodium is descriptive of the forms due to fusion of several cells. An example of the former process is found in the syncytial tissue of the chorionic villi, and of the latter in the phagocytic eosinophiles and macrophages which may form a plasmodium about bacteria, lose their identity as single cells but later may again separate and become free. Morphologically giant cells are further classified into myeloid with a central or equal distribution of nuclei and Langhans when the arrangement is polar or peripheral. As to the mode of nuclear division, both mitosis and amitosis may take place, the nuclei in the syncytium of the chorion, for instance, dividing by the latter process, and it is believed by the majority of observers that in pathological giant cells, while the nuclei in the early stages multiply by mitosis, later amitotic division takes place.

Giant cell formation is probably not peculiar to any type of cell and as their progenitors are found in leucocytes, plasma, endothelial as well as epithelial and connective tissue cells, a liberal interpretation as to their origin is only logical. When we consider the variety of conditions under which multinucleate forms occur, their presence can perhaps best be explained on the assumption of a tissue reaction, and that different cells when subjected to abnormal conditions, such as occurs when nutrition is impaired from mechanical or chemical cause, or when stimulation takes

place from the presence of an organism or foreign body, may give rise to these structures.

Pathologically, giant cells occur in their most typical form in tuberculosis, where the consensus of opinion appears to be in favor of their endothelial origin. While endothelial cells are phagocytic for bacteria it has been shown that they also react to toxins, as of the tubercle bacillus, for example, which are likewise capable of inciting them to proliferation. This is illustrated in tuberculides where giant cells are met with in the subcutaneous adipose tissue or more superficially in the corium about necrotic areas. In blastomycosis they probably arise from vascular endothelium,

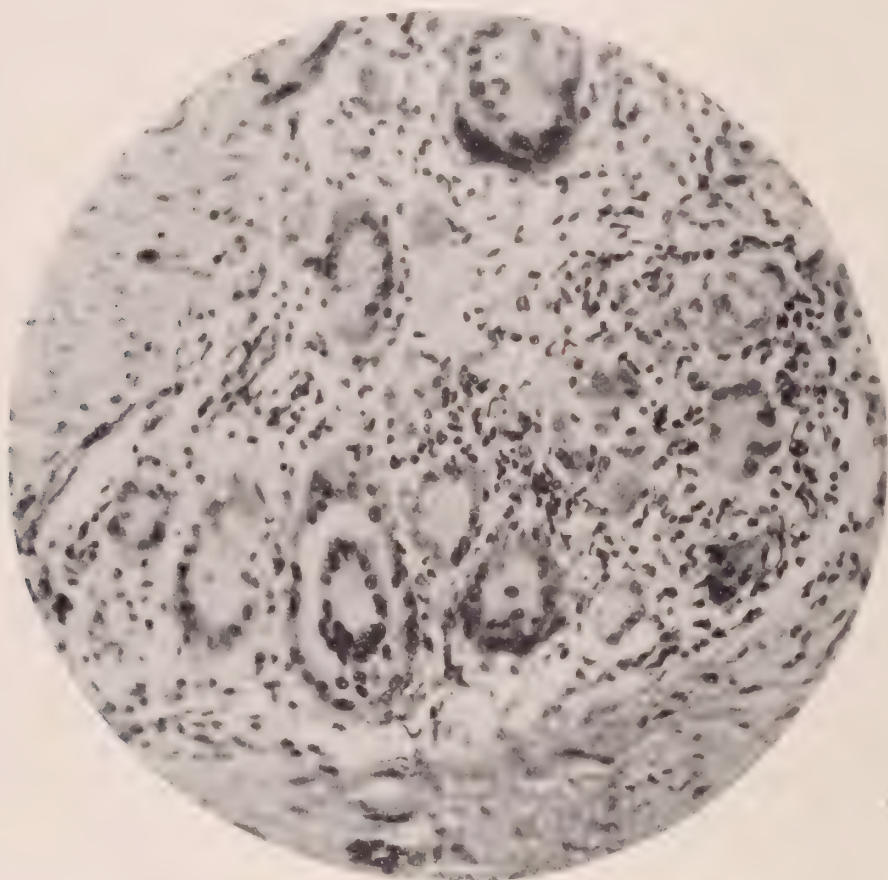


Fig. 1. TUBERCULAR SYPHILIDE.

Spencer $\frac{1}{4}$ in., Zeiss Proj. Oc. 2.

Section through an area containing a group of capillaries transferred into giant cells.

adventitial cells and leucocytes, but where they occur between the rete cells, the wandering cells offer the best explanation for their genesis, unless we admit ameboid properties of these multinuclear phagocytes. In certain types of sarcoma giant cells are also numerous, especially in myeloma, in which they differ from those of inflammatory conditions in having their nuclei distributed throughout the cell body as in myeloplaxes. They are not at all uncommon in epithelial or endothelial tumors, especially in connection with degenerating areas and often about epithelial pearls. In these growths it is probable that leucocytes as well as endothelial and epithelial cells contribute to their formation.

In syphilis giant cells play only a secondary rôle and are chiefly of

interest because of the difficulties they present in a differential diagnosis from other infective granulomata, especially tuberculosis, and on account of their possible influence on treatment. Although many minor distinctions are made upon which to base a diagnosis between a tuberculous and a luetic lesion, in the majority of cases from the histology alone it is impossible to say to which class of infections the specimen belongs.

Giant cells are not pathognomonic of any stage of syphilis. With the exception of the roseola and mucous patches they have been reported in

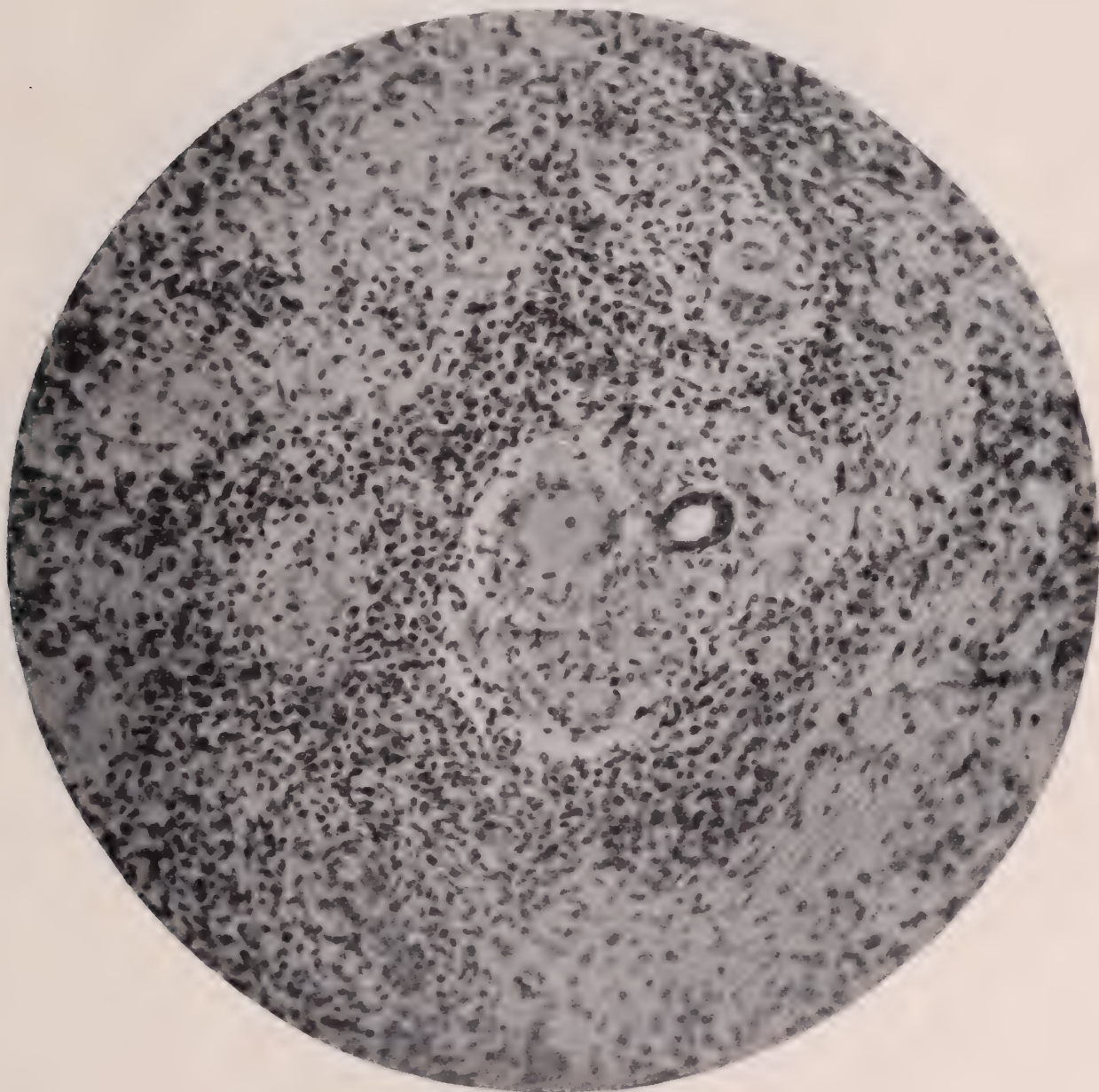


Fig. 2. TUBERCULAR SYPHILIDE.

Zeiss $\frac{1}{4}$ in., Comp. Oc. 4.

Showing vessels with proliferated endothelium and production of giant cells.

all other lesions of the disease. The writer's material does not verify their finding in initial lesions, but Unna reports them in the persistent nodules which often remain at the site of such lesions. They are more constantly encountered in the papular lesions, especially the small type or lichen syphiliticus and in the late secondary nodular or serpigenous

lesions. The view that they result from the fusion of plasma cells is still held by many histopathologists, and while not an untenable one, there appears to the writer more corroborative evidence in favor of their vascular origin.

The small lichenoid syphilide, owing to its localization about the hair follicle and the giant cells, which contribute so largely to the histological picture, is practically indistinguishable from that of lichen scrofulosorum.



Fig. 3. SERPIGINOUS SYPHILIDE.

Zeiss 8 mm., C. O. 4.

Giant cell formation and thrombosis of vessels in a serpiginous lesion.

The more frequent occurrence of giant cells in this type of syphilitic papule might possibly find an explanation in the richer vascular distribution about the pilo-sebaceous apparatus, and the operation of several factors over a limited area, such as the endothelial stimulation occasioned by the spirochætæ and the dense cellular infiltration confined to the follicular vessels. The latter interferes with nutrition and results in

partial or complete thrombosis of the capillaries which on cross section may simulate giant cells. (Fig. 1) illustrates a portion from such a lesion. Of the vast number of capillaries present in the early stages only a few dilated ones remain. The majority are either thrombosed or their former site is marked by a group of irregularly disposed nuclei or giant cell structures of the Langhans type which have probably arisen from a multiplication of endothelial cells.

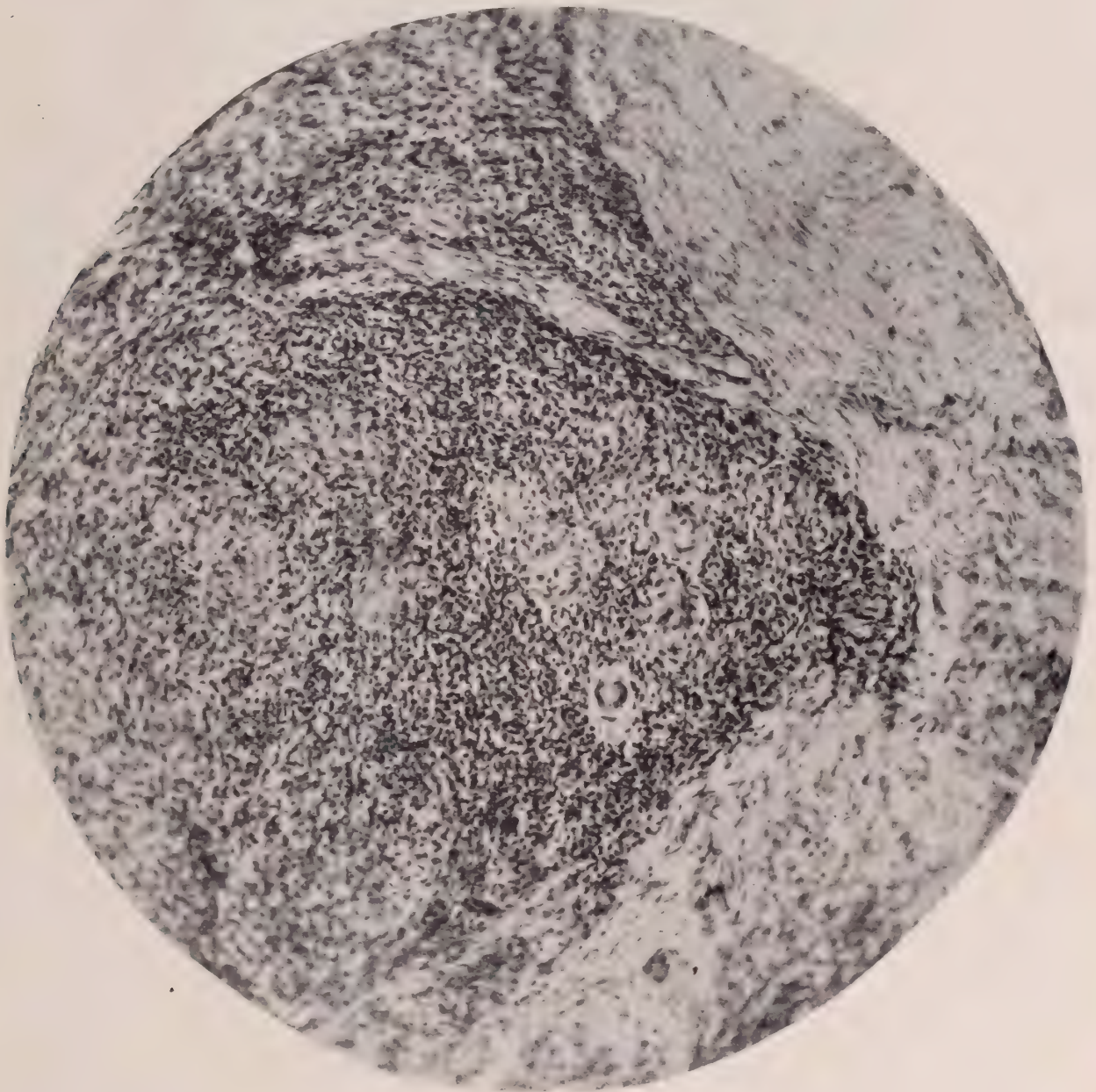


Fig. 4. LICHEN SYPHILITICUS.

Zeiss 8 mm., C. O. 4.

A focus from periphery of lesion showing giant-cell formation.

In the nodular lesion (Fig. 2) the microscopical picture is frequently that of a diffuse infiltration of the corium showing alternate light and dark areas. This mottling is due to changes which the vessels have undergone, the light areas representing all gradations from a choked up lumen with swollen and proliferating cells to distinct giant cell formation, while the dark ones are made up of the inflammatory infiltration. One

frequently notes also a variable number of endothelial nuclei irregularly disposed which may, perhaps, be looked upon as a transition stage.

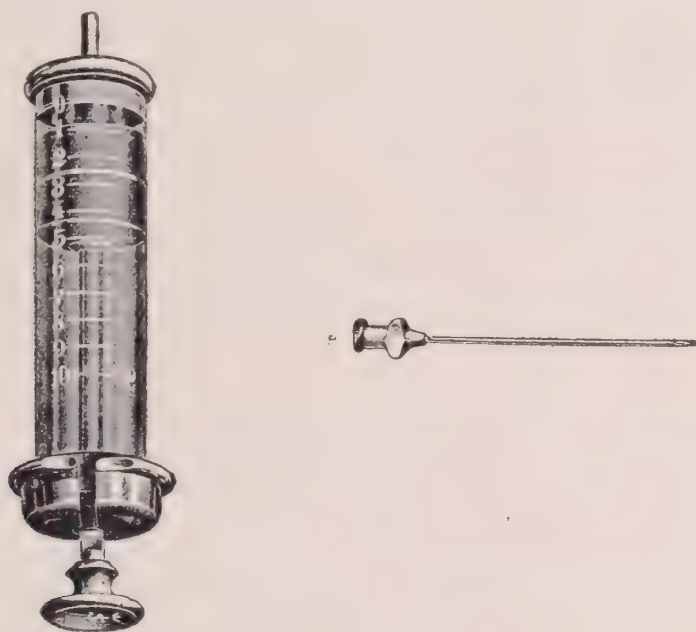
The histology of serpiginous lesions as illustrated by (Fig. 3) is very suggestive of the relation between the vessels and the clinical characteristics of this type of eruption. These changes have suggested to the writer that the extension of the serpiginous lesion may be due to a progressive thrombosis of the vessels. Cross section of the tortuous portions of the latter shows typical giant cell formation with proliferation of the endothelium, while tangential section shows the lumen occluded by a thrombus. This view is further supported by (Fig. 4), from a section in which several similar foci were almost exclusively made up of giant cells, varying in size and form, with single or multiple rows of nuclei after the Langhans type. The latter lesions had persisted for months in spite of most vigorous antisyphilitic treatment. Occluded or transformed vessels like the foregoing offer a plausible explanation for the failure of these and similar luetic lesions to yield to specific treatment, as it is obviously impossible for the drug to reach the morbid process. Those lesions of syphilis in which the vessel changes are most pronounced are the least amenable to mercury alone, as is illustrated in the obstinacy of the late serpiginous and gummatous lesions, but when this drug is combined with potassium iodide a very rapid therapeutic action is noted. The use of this mixed treatment, which is supported by clinical observation, may be explained by the action of the latter remedy because of its well-known property in resolving an inflammatory infiltration and possibly rendering the vessels which were previously occluded pervious to the action of mercury, the real agent in bringing about the destruction of the spirochætæ.

PERSONAL OBSERVATIONS WITH THE EHRLICH-HATA
("606") REMEDY.

By B. C. CORBUS, M. D., of Chicago,
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In a communication dated October 25th, 1910, Prof. Ehrlich says that so far forty thousand ampoules have been placed in the hands of the medical profession and that the new specific has passed the experimental stage, its therapeutic value being well established.

It seems almost incredible that a disease which has cursed humanity for ages should have its door unlocked in seven years, for it is but a short time since the possibility of animal experimentation with syphilis



on monkeys was announced, which led in turn to the discovery of the spirochæta pallida as the causative factor, followed two years later by the Wassermann test; and now, three years later we have a specific remedy in the dioxidiamidoarsenobenzol, or "606," which was discovered by Ehrlich and Hata, and announced to the profession by Alt, Schreiber, and Wechselmann (June, 1910).

Even if time should prove that this substance is not an absolute specific for syphilis, we can be well satisfied with our present results, for here we have the best aid yet available to combat this dreaded disease.

We have in "606" a substance that has been prepared on a scientific

basis, through years of careful research and experiments: a substance that was carefully tried out upon animals and trusted co-workers before it was given over to the general profession.

As it was not possible to perfect a serum therapy for syphilis, Ehrlich set about to find certain chemical substances that were particularly attracted to certain parasites, these he called parasitotropic. Being poisons and capable of injuring cells of organs, these substances are also organotropic and their curative value in parasitic diseases depends on the existence of a proper relation between the parasitotropic and the organotropic properties. After many experiments and many failures, Ehrlich finally succeeded in preparing dioxidiamidoarsenobenzol for the cure of syphilis.

The parasitotropic power of this remedy, if used in the proper dosage, greatly overshadows the organotropic, and so far in fourteen thousand cases reported there have been no evil results or organotropic disturbances which could fairly be attributed to the Arsenobenzol.

Ehrlich believes from the results of animal experiments, that the most efficient method of combating this disease is by his "Therapia Sterilisans Magna;" that is, by killing as many spirochætes as possible by one maximum dose, in the same way that malaria is combated by exceedingly large doses of quinine in a short interval. We all know that by giving small doses the organism may become accustomed to the substance as shown by Dr. Marks, Ehrlich's first assistant, in the action of "606" on the trypanosomes.

Indications and Precautions.—At the present time, "606" is indicated in every case of active spirochætal infection, but most particularly in all cases of primary, secondary, and tertiary lues with external manifestations.

In visceral and cerebro-spinal syphilis, it should be used with extreme caution depending upon the condition of the patient.

In aortic aneurism of syphilitic origin, also, extreme caution should be used.

Dosage.—The drug has been described as a sulphur-yellow powder. It is put up in vacuum ampoules, as the drug is manufactured entirely under nitrogen, and it must be prepared immediately before using.

The dose depends upon the method of administration, the length and severity of infection, and upon the age of the patient.

Children—0.002 grams for babies five to six weeks old have been given repeatedly intramuscularly, but here of course the dose must be proportional. Ehrlich discourages the administration of "606" to children under the age of one year.

Women.—The average dose intramuscularly is from 0.45 to 0.6 grams, while by the combined method 0.4 to 0.5 grams intravenously may be safely followed by 0.45 to 0.6 grams into the glutæus depending on the weight of the patient.

Men.—The average intramuscular dose is 0.6 grams, but by the combined method 0.5 to 0.6 grams intravenously followed by 0.6 grams intramuscularly is considered safe in well-nourished patients.

If we expect to accomplish a maximum effect and adhere to Ehrlich's theory of "Therapia Sterilisans Magna," it is necessary to give as large a dose as possible. However, in latent syphilis and cerebro-spinal syphilis where the infection is reduced to a minimum, the dose may also be reduced.

Administration.—The many methods of administering the remedy are indeed confusing. The original technique of Alt, of intramuscular injections, as recommended by Ehrlich, and practised by Lesser in Berlin at the Charité, and by myself in this country is by far the simplest.

The neutral suspension, as employed by Wechsellmann, is difficult to prepare, is apt to cause complications, and is far slower of absorption; the method of Kromayer is not difficult to follow, but I have had no personal experience with it. The numerous other methods are practically only slight modifications of either the neutral suspension or the alkaline solution methods.

The most rapid in its action is the method of giving "606" by intravenous injection suggested by E. Schreiber, though it is followed at times by vomiting and a considerable rise of temperature. These conditions are not produced by the substance, but by endo-toxins suddenly liberated into the blood stream from the killed spirochætes.

For a more comprehensive method of taking up the management of the different kinds of syphilis, the following classification is used:

- (1) Congenital syphilis. a—Scelerotic.
- (2) Primary affections. b—Erosive.
- (3) Early secondary.
- (4) Late secondary.
- (5) Tertiary.

Congenital Syphilis.—While I have had no personal experience with "606" in hereditary syphilis, I have seen numerous cases treated in both Wechsellmann's and Lesser's clinics. The dose employed was usually 0.002 grams. All babies that I saw treated showed a wonderful improvement in four to five days. Patients covered with macular eruptions cleared in five to six days. Karl Taege's unique experiment may be of interest in this connection.

A woman pregnant at term exhibited mucous patches, condylomas, and spirochætes. The child was born extremely pale, weak and sickly. It did not cry, but lay in an apathetic state and took the breast poorly. No characteristic signs of syphilis appeared until the eighth day, when numerous lesions of pemphigus appeared on the soles of the feet and at the same time syphilitic paronchia on both hands. These lesions tending to spread, the mother was injected into each buttock with 0.03 grams of Ehrlich's "606" in sterile water. On the third day the woman complained

of pain, on the fourth day a reddish exanthem appeared on the buttocks, and on the fifth day a headache developed. Three days after the injection the lesions began to fade rapidly and the spirochætes disappeared. The child showed increased spread of the lesion for two days following the mother's treatment. The third day it showed rapid clearing up of the symptoms and by the fifth day the pemphigus and the paronychia had disappeared, the grayish pallor had given place to a healthy tint, the child was no longer apathetic, but cried lustily and took the breast greedily. Ten days later the child was well and free from symptoms.

An explanation of the production of this remarkable result is difficult to find. That the "606" compound was not transmitted to the child through the mother's milk was shown by the fact that this milk contained no trace of the arsenic. Ehrlich himself explains it by the theory that the sudden destruction of the spirochætes set free a large amount of endotoxins which excite the productions of antitoxins, and the latter are then transmitted through the mother's milk to the child with curative effect. However this may be, the sudden clearing up of the symptoms in the child did follow the use of the "606" on the mother, and this result may offer a new and improved method for treating syphilitic infants. Ehrlich especially warns against injecting his remedy directly into small infants, not from any toxic quality in the remedy itself but from the large amount of endotoxins liberated in the child's system from the destruction of the many spirochætes.

Herxheimer and Michaelis both report post mortem examinations on babies that had died following injections of "606;" they attribute the death as not due to the direct action of the substance, but to the action of the endotoxins produced so suddenly as to absolutely annihilate the little patients. In none of the organs, only excepting the lungs, could any spirochætes be found, whereas only a few degenerated forms were found in the latter organs.

Primary Lesions.—In an article in the *Journal of the American Medical Association* in the fall of 1908, I advocated the total excision of the primary lesions. In doing this I was carrying out the teachings of Neisser and Jadassohn, knowing full well that I could not abort the infection, but believing that I could attenuate it by removing in mass the first known collection of spirochætes. In a recent article that appeared in the same journal, I cited numerous cases that were treated in this manner, always beginning treatment immediately after excision was performed. In all of these cases in which treatment has been carried out as directed the cure was rapid under mercury and iodide treatment.

With "606," I believe it is possible to do the same thing only in a much shorter time.

The most successful and ideal case for treatment is the primary lesion with an early diagnosis made before the system has been invaded to any considerable extent by spirochætes.

With the dark field illuminator and the india ink stain, the task of making a diagnosis is not difficult, and it is imperative if we wish to make the most out of our treatment and to carry into effect Ehrlich's theory of "Therapia Sterilisans Magna." To wait for secondaries, is like closing a door after the flies are all inside.

In this class of cases, Ehrlich himself suggests that first the primary lesion be disposed of either by excision or the cautery, then immediately an intravenous injection of "606" is to be given, followed in five days by the intramuscular injection of a weak alkaline solution of the specific.

The first dose will act immediately as a mighty sword, killing thousands of spirochætes, but it will soon be eliminated. The second dose will act as a skirmish line in the rear and will effectually take care of the straggling spirochætes that chance to remain behind. This is Ehrlich's theory of "Therapia Sterilisans Magna" and this is what is meant by the statement that he can cure syphilis in one single dose, namely, 0.5 or 0.6 grams (entirely) intravenously followed in five days by 0.5 to 0.6 grams intramuscularly.

Of course this is only possible in cases in which the diagnosis is made before the Wassermann shows a systemic invasion.

The procedure, however, is not limited to primary cases, for it is our duty to carry out the same technique, in all primary, secondary and tertiary infections when we believe that the infection is severe enough to warrant such a procedure.

In reference to the erosive and sclerotic chancre, the latter, on account of the severe endarteritis present, offers a most resisting wall for the protection of the spirochætes from the substance, and it should, therefore, be excised in every case where it is possible without undue loss of tissue.

So firm is my belief, both from personal experience and from observation, that if it were possible to have all our cases come for treatment at this time, I am convinced syphilis should be eradicated forever in the above manner, but unfortunately we must treat the patient that has gone before—namely the one carrying the later forms of disease.

Early Secondaries.—It is this class of cases that we see most often. Here the infectious organism has gone through the system. Where we had relatively few organisms in the primary stage, we now have millions and the possibility of killing every spirochæte in one or two doses (namely an intravenous and intermuscular) is doubtful. However, we must place the patient under treatment at the earliest possible moment, for every day means continued growth of the spirochætes and just that many more to exterminate. By injecting the patients as soon as a diagnosis is made, I believe from personal experience that it is possible, to so sterilize them at once, that they are rendered safe members of their families and communities. That it is possible to completely destroy the organisms in

manifest lesions in from twenty-four to forty-eight hours has been repeatedly reported by many observers.

Late Secondaries.—The most infectious and discouraged patients are those that reach their second, third, and fourth year with the disease still manifest. In one instance, I found the organism in mucous patches eight and one-half years after the primary infection.

In this class of cases it may be possible to dislodge the spirochætes, as it were, from the glandular, osseous, or any other tissue they may happen to be located in by a preliminary treatment with potassium iodide. This is the method that I am following out at the present time and soon I expect to put them through the same course of treatment as the more acute cases.

Tertiary.—It is this class of cases that responds most beautifully to the specific. This is due, in the opinion of Ehrlich, to the fact that there are a large number of antibodies in the circulation and one injection stimulates the organism in an emphatic manner. It may also be explained on the hypothesis that the strain of spirochætes present is well-nigh exhausted in virulence and that a little of the specific acts in a far-reaching manner.

In Wechselmann's clinic in the Virchow Krankenhaus, and in Lesser's clinic in the Charité, I have seen most beautiful results, and in one case of my own series a gumma involving the nasal bones had completely healed in seven days.

As my observation and personal experience with dioxidiamidoarsenobenzol is confined entirely to the manifest external signs of syphilis, I am at present not able to form any opinion in regard to its value in visceral syphilis and in syphilis of the nervous system. In fact, Prof. Ehrlich expressly requests that the substance be used at first only upon early cases, knowing full well the danger of complications in patients who are already debilitated by disease.

However, the substance has been tried on every phase of the disease. Almost all of the investigators have treated a limited number of tabetics, but the results in these were variable. All agree that in paresis the substance should be given as soon as the diagnosis is made.

Excepting optic atrophy the substance has been used in lesions of the eye by Professor von Grosz, head of the first Ophthalmological Clinic of the University of Budapest. He has treated successfully by means of "606," 14 cases of syphilitic ocular lesions: 1 ulcer of the cornea, 3 iritis, 1 iridokeratitis, 1 scleritis, 2 chorioretinitis, 6 keratitis. He furthermore declares that the existence of syphilitic ocular lesions should not be considered a contraindication in treatment by this method.

In aortic aneurysm of luetic origin unless the diagnosis is made extremely early, we had at present better confine the treatment to mercury and the iodides.

Results.—All observers agree that the immediate results are sur-

prisingly favorable. I believe from observations on my thirty cases treated to date, that it is possible to do more with one injection in four days than one can accomplish in six to seven months with continuous mercury treatment. As compared to all other forms of treatment, in primary, secondary, and tertiary cases, in the absence of fundus changes and of kidney and cardio-vascular disease, it is the treatment that is demanded as the best means of combating the disease early.

In all my cases using the intramuscular method of Alt and Lesser, I have had no complication. It may be necessary to employ later some form of mercury treatment in addition, but even then we know we have our patients already well on the highway to recovery.

The question arises, What are the remote effects and how can we tell whether a patient is cured?

Up to the present writing, with fourteen thousand cases reported, the observations extending over a period of twelve months, there have been no serious after-effects in competent hands.

As we are dependent entirely upon the Wassermann examination as the only method now at our command of sufficient accuracy to show when a given patient is cured, we will have to be content to wait until numerous statistics are available before we can draw conclusions.

In the meantime we must strive to be exact in diagnosis, using laboratory means when in the least doubt and employing above all things, absolute accuracy and thoroughness in the technique of administering the substance.

THE PUBLIC AND SYPHILIS.

By ISADORE DYER, Ph.B., M. D., of New Orleans,
Dean and Professor of Diseases of the Skin, Medical Department, Tulane University of Louisiana, New Orleans.

With the pandemic spread of syphilis over continental Europe in the sixteenth century, the first public notice of the "Italian Disease" probably was effected. No doubt earlier epidemics occurred and may have attracted attention, but syphilis as such was not isolated and recognized sufficiently to be remarked. In Scotland particularly, syphilis made such extensive ravages that its progress in households and community was comparable to the plague.

Such a wave of infection has not occurred since, and to-day it is not at all likely, since syphilis has become so generally known and so generally prevalent that few countries of the world are virgin to this disease.

While the source of origin of syphilis is still unknown, there is strong opinion based upon Biblical references placing the disease among the Levitical types, while on another hand the pre-Columbianites have presented many arguments and much evidence to show syphilis an early American disease.

The facts remain that the disease has spread systematically along the avenues of civilization and colonization and that the least affected are those districts and countries most remote from large centres of population.

The efforts to treat syphilis, together with the natural progress of the disease to self-limitation, have resulted in a general immunization in those countries where the disease has for long prevailed. At the present time the profound evidences of syphilis occur in country districts and in new territories where the disease is more recent.

The by-effects, however, as expressed in late nervous affections and in the evidence of hereditary influence are constantly on the increase, and the insane asylums everywhere are burdened with the victims of this disease, either suffering the penalty of their own sins or the transgressions of their ancestors.

The estimate of the prevalence of syphilis can only be comparative, as any statistics must be inadequate and inaccurate with a condition which is so often concealed by the physician who may have occasion to treat it.

Insurance companies have contributed largely to the study of the incidence of syphilis and its relation to longevity; and in the past twenty-five years the actuary tables of these companies have been almost the

only reliable basis for a study of syphilis in relation to the economics of human life as compared with other diseases.

In the absence of any known basis of estimate for the occurrence of syphilis, certain syphilographers have drawn conclusions from the limited observations of those who have made records of such and who most often meet the disease.

Some years ago one of these (the late Dr. Hyde) estimated that about 18 per cent. of the people of the United States were syphilized. Accepting this estimate, hypothetically only, the figuring is appalling enough to demand a wider interest and broader knowledge of syphilis among the public than has hitherto obtained.

Until quite recent years, syphilis has been a subject tabooed in the periodical and daily press, as well as in circles of people otherwise educated. Latterly a more general interest has been excited by the legislation undertaken in a few States, and by the medical discussion of the disease with reference to its treatment and its relation to sociological questions.

Although a number of diseases far less virulent have been listed among the quarantinable diseases, syphilis has never been entertained from that point of view, in spite of the fact that to this factor alone is due a larger proportion of defectives, in and out of the insane asylums, than to any other cause.

The habit of relegating syphilis to the venereal group and classing it as a vicious condition has prevented a free discussion of its importance to society. With the recent advanced ideas among the reading public, and with the improved educational basis in the minds of such, the field for instruction is ripe and the present generation should be made to know all that syphilis means.

Several of the United States have already legislated regarding the marriageability of syphilitics and eugenists have urged the protection of the offspring of such persons by radical procedures. There is a middle ground, however, and based upon the known curability of the disease. With the present laboratory technique available, no mistake should be made by those who have ever had syphilis, and a proper safeguard of society could be provided if the knowledge of these things were made common. A Wassermann test is obtainable almost everywhere to-day and its evidence is always important enough to stay the young man engaged in the pursuit of matrimony.

It is a crying disgrace to modern methods prevalent in hospital and clinic practice that syphilis is not made a more important subject of care, so far as education and treatment are concerned. Even with the presumptive estimate that only one in fifty persons exposed to syphilis contracts the disease, it remains that some twenty-five per cent. of innocent persons acquire the disease outside of sexual relations, and those twenty-five in each hundred should be protected.

In such a brief review of the relation of the public to syphilis it is impossible to go far afield, but a summary of this topic might be submitted for medical men and others to reflect over.

Syphilis is a disease of long standing and is a part of the practice of every physician of to-day. Ignorance prevails in and out of the profession as to the possibilities in its effects and in its relief.

If the public knew more about syphilis, there would be less of it.

Health boards everywhere should distribute systematic information regarding the dangers of syphilis and its methods of spread, as well as concerning its evidences and concerning its effects.

Hospital authorities and physicians connected with eleemosynary institutions should provide more indoor facilities for syphilis in its acute stages so as to minimize the possibilities of infection of others.

The United States Government should make syphilis a quarantinable disease, and as soon as practicable local health authorities should endeavor to make syphilis a reportable disease.

We are all striving to make a saner world, and it is constantly brought to the intelligence of thinking men in all fields of humanitarian, sociological, and altruistic operation, that the more knowledge we may spread the more co-workers in our fields will develop; and though no Utopia may be consummated, the need of correction will grow less and less with the increased knowledge of the evils and their shadows in the vale of mortality.

SYPHILIS AND PULMONARY TUBERCULOSIS.

By ROBERT H. BABCOCK, M. D., LL.D., of Chicago.

Physicians have long recognized the comparative frequency with which disease of the lungs develops in persons showing luetic symptoms, or having a history of syphilitic infection years earlier. The question of special interest in those cases showing ulceration and other signs of phthisis was whether pulmonary syphilis could and actually did produce destruction of the lung parenchyma, or was there an added tuberculosis to which the extensive lung changes could be ascribed. In contrast to these cases are others in which pulmonary tuberculosis exists and is recognized as the conspicuous pathological feature, but in which either from the anamnesis or from the anomalous behavior of the disease, the query arises as to the possibility of a combined luetic infection that is responsible for the development of the tuberculosis and for its more or less peculiar course.

Relative to the former class of cases it may be stated, that the consensus of pathologists and clinicians seems to be that pulmonary syphilis alone does not lead to softening and excavation, and that when such changes occur they are the result of a superimposed tuberculosis. With reference to the latter diagnostic dilemma, clinicians until recently have been compelled to rely on the discovery of stigmata of lues or on the therapeutic test, mercury and iodides. Fortunately, we now possess in the Wassermann reaction a reliable means of diagnosis, and in suspected cases are able to institute a proper, energetic therapy before the disease has progressed to lung destruction.

As to the effect of the association of these two infections it would be quite natural to suppose this would be disastrous, but strangely enough observations and opinions on this point seem conflicting. There are some—Pourtales, Abrahams, and Ross—who think syphilis exerts a retarding and, in some cases, even a curative influence over the tuberculosis, while others hold that pulmonary tuberculosis is distinctly aggravated by its association with lues. Cases sustaining both contentions are to be found in the literature.

Thus R. Abrahams and F. W. Ross have both reported instances of a man who in the incipient or early stage of pulmonary tuberculosis acquired a chancre and who thereafter showed marked improvement in their lung condition, and ultimately recovered. On the other hand, Stieffel recorded the case of a woman in advanced consumption, who became in-

fectured with syphilis and being unable to endure specific medication rapidly succumbed.

The foregoing cases then raise the interesting question: Is the effect, whether injurious or benign, dependent on the sequence of events as regards the acquisition of the two infections? That is, is the ultimate outcome dependent on which disease is primary and which is secondary. If, as suggested by Pourtalis, there is a natural antagonism between the germ of tuberculosis and that of syphilis, then the acquisition of a chancre by a tuberculous individual ought, under all circumstances, to be more or less salutary, which as shown by Stieffel's case is not the fact.

Accordingly, when we come to analyze the reported cases of conjoined lues and tuberculosis, we discover that the effect depends largely on the stage of the primary infection. Thus, if an individual acquire syphilis in the incipient stage of his pulmonary tuberculosis, or at least before his lungs show signs of advanced disease, and before his general health has suffered greatly, then the influence of the second, that is, the luetic infection may not be disastrous, but may actually retard the advance of the tuberculosis. In other words, the syphilitic infection added to pulmonary tuberculosis, when the latter is advanced, will probably prove most unfortunate and hasten the downward course of the primary disease.

How is it now as regards the development of pulmonary tuberculosis in a person already infected with syphilis? The course of events now is reversed, for in the active stage of the lues, that is, in the initial or secondary stage, the addition of tuberculosis seems to prove disastrous, as the tuberculosis of the lungs makes rapid progress. If, on the contrary, pulmonary tuberculosis makes its appearance during the late stage of syphilis, it is likely to pursue a slow course, although no actual curative influence on the part of the lues is apparent.

From the foregoing facts we may conclude that when a consumptive is already much reduced by the mixed infection of advanced phthisis, his constitution is too greatly undermined to endure the addition of still another infectious process. He is, moreover, in no condition to bear a vigorous antisyphilitic medication. When, on the contrary, a person in the third stage of lues becomes smitten also with tuberculosis, his lungs resist the destructive tendency of the latter process because probably of the tendency to fibrosis manifested in the late period of lues. In many cases the general health does not seem seriously impaired in this stage, or at all events so reduced as to render it incapable of offering some degree of resistance to the tuberculosis. We can understand also why syphilis and tuberculosis, when both are in the early stage, should prove so serious an affair. The individual in the primary or secondary stage of lues has not yet developed sufficient antibodies to resist the *spirochæta pallida* as in the late stage, and hence the addition of the tuberculous infection only helps to overpower his resistance. But it is difficult to explain those instances of marked improvement following the addition of syphilis to a

previously existing, yet incipient or still early pulmonary tuberculosis. It may be conjectured that either one or possibly both strains of organisms were not especially virulent and their antibodies were capable of exerting some mutually counteracting influence. However this may be, one would hesitate to advise a tuberculous patient, still in the early stage of his disease, to contract a chancre in the prospect of its favorably affecting his original infection.

Only a few words need be said as to treatment of these combined cases in whatever stage. Experience has shown that the iodides are not well born since they undoubtedly tend to hasten the softening of the tuberculous foci.

The new remedy, "606," does not seem to have been given an extensive trial in cases of the kind here considered, but, so far as the writer has ascertained, promises well. A remarkable improvement in general nutrition follows its injection, and hence the remedy ought to affect favorably all cases in which the patient is not too greatly reduced or the lung destruction not too great. Complications as nephritis, arteriosclerosis and myocarditis, all of which are sometimes seen in these doubly afflicted individuals, would contra-indicate the employment of the remedy.

All cases which for one reason or another cannot be subjected to "606" should receive, in the writer's opinion, an energetic mercurial treatment. This is true especially for all patients who are not too much reduced. In such, mercury should be tried, but cautiously, until its effect on general nutrition is determined. In the experience of the writer the conjoined use of inunctions and subcutaneous injections has given excellent results and this combination is recommended, therefore, when Oertel's remedy is not available.

SYPHILIS AS A CAUSE OF PAUPERISM.

By A. RAVOGLI, M. D., of Cincinnati.

We understand with Robert Hunter¹ a pauper to be one who depends upon public or private charity for sustenance. Paupers must be included among those suffering poverty, but poverty is a much broader term than pauperism. In order that a man may be able to work and provide for his family he must have a high degree of physical efficiency. When a man cannot retain his physical efficiency, he must degenerate. Living in poverty for any length of time means a loss of power, which renders the man unable to work; an unfortunate condition which has as its ultimate result pauperism. When a man has become infected with a disease which takes the vitality and energy out of him, he finds himself discouraged in the pursuit of his calling; he suffers mentally and physically, and becomes unable to perform work.

The man without means and without the possibility of earning his living, begins to drown his sufferings in alcohol, or to drive them away with morphine, or with cocaine. In other publications of ours, syphilis has already been pointed out as one of the causes of morphinism, of cocainism, and, in its ultimate result, of crime. This is not the place to study other arguments, since we must confine our attention to the consideration of pauperism. The man who suffers mental agonies on account of his face being deturpated with ugly sores, his limbs being painful and hard to move on account of syphilitic arthritis, has nothing else to which to turn but a public hospital.

The treatment and the better nutrition help the physical condition of the patient, but they do not improve him mentally. He gets better and is discharged from the hospital. He has already found out that he is dependent, and if unfortunately he has a family, their independence is undoubtedly destroyed. On the ground of sickness they apply for private alms or for public outdoor relief. Charity, although kind, especially if from a private source, has in its ultimate result the degradation of the family and, more particularly, the loss of self-respect. When the self-respect is lost the whole family may remain for their life nothing else than paupers.

The pauper, destitute not only of the necessities of life, but of his physical efficiency, depends on others for relief. The relief even then obtained for accidental occasions in temporary need, may sometimes cause the person to ask for a continuance of relief and to become addicted to seeking gratuitous maintenance. A pauper undergoes a mental

and physical degeneration, which causes him to become incapable of self-support.

In the present social condition, too, a man, suffering pains when released from the hospital, cannot easily find work. On account of his poor health, he cannot continue to earn his living for himself and for his family if he has one, and, as a consequence, when facing starvation, he may become a pauper or a criminal. According to R. L. Dugdale,² the choice would rest entirely on the temperament of the person, since more vigorous men and women become criminals, while the weaker ones become paupers.

The pauper, in many cases, is responsible himself for his misery and degradation, since in case of habitual inebriety or in newly contracted syphilis, he fails to be treated, and in this way loses his physical ability to work.

Syphilis is that disease which affects every organ of the body by causing destruction and impairment of its functions. After gonorrhea, syphilitic diseases of the eye are the most frequent cause of blindness. The eye is affected, in the secondary period, and in the tertiary period of the acquired disease, but in a great many cases children become blind on account of hereditary syphilis.

In the secondary period, the conjunctiva is often affected with syphilitic papules, or even gummatous infiltration, which maintain a reddened condition of the conjunctiva in the form of chronic conjunctivitis. In these cases, on account of the long standing process, a thickening of the conjunctiva may result in a form of pterygium. Affections of the cornea, according to the observations of Hutchinson, have been found quite frequent as a manifestation of syphilis, either acquired or from hereditary taint. The commonest form is that of keratitis parenchymatosa, which sometimes also is accompanied by troubles of the ear.

Syphilitic iritis is an affection quite common in lues, and we can say that more than one-half of the inflammatory affections of the iris are of syphilitic origin. Iritis is found in the secondary as well as in the tertiary period. Iritis is often associated with choroiditis and retinitis. In the earlier stages of syphilis it has a papular form, in the shape of pin-head nodules, which can be seen in the body of the iris or at the pupillary margin; in the later stage it is of a gummatous nature, appearing as a small yellowish-red nodule imbedded in the corner of the iris. As result of this affection, posterior synechiæ, or even occlusion of the pupil, may take place with necessary impairment of the vision. In some cases repeated inflammations of the iris and of the choroid may end with secondary glaucoma.

In affections of the intracranial portions of the optic nerve, or when gummata of the brain and its meninges are present, optic neuritis in its various forms may occur within the cranial cavity. From the syphilitic attacks on the blood-vessels, neuroretinitis may arise as was referred by Ostwald, Haab, Leggel, and H. Magnus. Amblyopia and amaurosis are the unfortunate consequences of cerebral syphilis.

We are indebted to Dr. Louis Stricker, of Cincinnati, a member of the Blind Relief Commission of Hamilton County, for the following report of his studies of the relation of syphilis to blindness:—

In my work as a member of the Blind Relief Commission of Hamilton County, I have examined up to date 417 applications for the pension, and in every case a critical study was made to ascertain the cause of the blindness and the disease from which the individual lost his sight. I herewith give you the figures:—

Total number examined.....		417		
Total number syphilitic.....		96	Of these congenital.....	41
			Acquired.....	55
<i>Congenital.</i>				
Malformations	Microphthalmus.....	2		
	Buphthalmus.	1	3	
Phthisis	Bulbi.....		2	
Interstitial	Keratitis.....		1	
Uveal Disease	Irido-cyclitis	3		
	Uveitis.	2	5	
Cataracts	Polar.	1		
	Zonular.	5		
	Luxated.	1		
	Membranous.	1		
	Soft.	2	10	
Retina.	Choroidoretinitis.	5		
	Retinitis Pigmentosa. . .	3		
	Embolism C Artery....	1	9	
Optic Nerve	Atrophy.	11		
	Total.....	41		
		Not on the Pension List...	5	
<i>Complications.</i>				
			Mentally Defective.....	5
			Locomotor Ataxia.....	1
<i>Acquired.</i>				
General Uveal Disease.....		8		
Trigeminal involvement with secondary ulceration of the cornea. (Mooren Ulcer).		1		
Retinitis Pigmentosa.....		1		
Choroidoretinitis.		8		
Optic Atrophy		37		
Total.....		55		
		Not on the Pension List.....	5	
<i>Complications.</i>				
			Insanity.....	1
			Locomotor Ataxia.....	17
On the Pension List. Congenital.....		36 at 37.50.....	\$5,400.00	
		Acquired.	50 at 37.50.....	7,500.00
Cost of Syphilis to the County, per Year.....				\$12,900.00

From the report of Dr. Stricker it appears, that the number of unfortunates who have lost their eyesight in consequence of syphilis, acquired or hereditary, is 25 per cent. The cost to the county to provide in some

way for those dependents is \$12,900.00 per year. Yet almost in every city the blind are permitted to beg, as there is no adequate public provision for their support.

This clearly shows that syphilis, by depriving a person of his vision faculty, is a cause of pauperism. Syphilis, however, affects every organ and every tissue of the body, especially the nervous system, producing the most varied forms of neuroses and psychoses. It exerts a great influence in the production of idiots and of feeble-minded, who are often left to the care of relatives.

Nosography.—The man, who had that little chancre some five, ten or more years ago, which had been nearly forgotten, is suffering with rheumatism. He goes to bed at night to rest from the hard toiling of the day, pains affect his head in the form of neuralgia, or his legs as *dolores osteocopi*, *dolores nocturni*. He cannot sleep, cannot get one hour's rest. At dawn he must get up and go to work. The poor man is willing to work, to support his family, but has little efficiency, has no strength after passing sleepless nights, cannot earn what is necessary for himself and family, and soon understands that he is afflicted with sickness and poverty. He and his family deprived of the necessities of life must apply to dispensaries for medicines, for treatment, and then apply for relief, which although temporary is continued for a long time and may place that family among paupers. Charitable organizations state that about one-fourth of distress is caused by sickness, and nearly half of this fourth, in the opinion of the writer, is to be assigned to syphilis.

Syphilis is the cause of incurable gangrenous ulcers of the legs, and of other parts of the body. It causes obstinate arthritis of different joints. The incurable and crippled who are helpless are numerous in large communities and in general are not sufficiently taken care of in the cities. When syphilis has been neglected in the beginning, then considered ordinarily a mild case, it takes hold of the whole organism, and appears late in life in the most varied forms of chronic osteochondritis or of periosteal gummata. In the form of arthritis it produces effusions in the joints—hydrarthrosis, and as osteochondritis,—subluxation, pseudarthrosis, and immobility of the affected joints.

Those cripples and those affected with incurable ulcers of the legs are usually beggars. They are paupers, confirmed paupers. They beg and the little they obtain, they spend for alcoholic drinks. They sleep in lodging-houses, and when they have not the dime for a bed they apply to the station-house. The ulcers are left to themselves, vermin take hold of the whole bodies of those unfortunates, and then they are taken to the hospital. They are assigned to the dermatological service. Their clothes are alive with lice, their ulcers are covered with maggots. In this condition they come to our ward. Half stupid, trembling, they are scarcely able to reply to the questions. Usually they are old customers, known for many years to us and to our nurses. Bichloride is the grandest remedy to kill

bugs and clean the dirty surface of the ulcers. With the abstinence from liquors, with good food, some rest, external and internal specific treatment, the ulcers heal up, the arthritis improves, the patients take on a better appearance, and they are discharged. Soon after they leave the hospital they return to the saloon, begin to drink again, then occasionally go for thirty days to the workhouse, return to the same miserable condition, apply again to the hospital, again come to the dermatological service. Finally to get rid of them we send them to the County Infirmary. In these cases, without doubt, the reason of pauperism rests entirely upon the individual. If the individual, however, would have been healthy and had retained his efficiency he would never have reduced himself to such an abominable condition, and would have worked. These are other cases where syphilis is responsible for their poverty and for their depravation.

Apoplexy and paralysis in a man above sixty years is in most cases the result of syphilis, which is so deleterious in its action on the blood-vessels. When a man is paralytic, the welfare of the whole family, when depending on him, is gone. It stops his earning power entirely. In some cases, of course, the oldest children can provide for the family. Sometimes the wife, too, has been slightly infected and her health becomes delicate. Often she suffers with cephalagia, has leg ulcers, which make her unfit for wage-earning.

From the same syphilitic origin pitiable cases occur, which are not the offspring of our imagination, but are facts of our experience. The mother has given birth to a tainted child, the babe is sick, keeps fretting, is sleepless, can hardly breathe on account of snuffles, is covered with a papular eruption, and has mucous patches of the mouth. The poor creature is suffering for the sins of its father. It is not always so clearly indicated that syphilis affects the tainted babe, since there are some forms of disease, which although not exactly syphilitic manifestations, are nevertheless the results of a hereditary luetic taint. In a great many cases laryngismus stridulus, eclampsia, infantile paralysis, chorea, and even epilepsia are produced not by special hypothetical bacilli, but by the *spirochæta pallida* given to the offspring at the time of generation by the parents. In this case let us consider what happens in the family. The father may be sufficiently well able to work, but at night instead of resting, he is compelled to help the mother to nurse the child. In the morning he is tired, and unfit to take up another day's hard work; as a result he may lose his position, the whole family remaining destitute, without means of support. Here is the terrible association of sickness with poverty.

It is not only a few families that suffer sickness and poverty on account of this treacherous disease, but many are compelled to apply for relief on account of inability to work brought on by syphilis. The latest attacks of syphilis on the nervous system in the form of paralysis, of general paresis, or of locomotor ataxia, are quite frequent and make the man

unfit for work. In those families every valuable thing is sold to keep up the expenses, and when there are no more means the patient is sent to the City or County Infirmary and is a pauper, a charge on the community. These forms of nervous affections have been grouped in a separate class as parasyphilitic diseases. The reason is that the antisiphilitic remedies have no beneficial influence on them; moreover, they are made worse by the use of mercurials and the iodides. But although they are called parasyphilitic, the Wassermann test has shown the positive reaction of the blood in most of these cases, conclusively proving that they are the sad end of syphilis on the delicate cells of the nervous structures.

In the Cleveland Asylum for the Insane were fourteen men and two women affected with insanity caused by syphilis. In the Athens Asylum for the Insane only one was insane from venereal disease, but twelve were affected with epilepsy. Many cases of insanity are ascribed to bodily diseases, hereditary influence, congenital defects. Syphilis is not mentioned. From the report of the Board of the State Charities of Ohio³ it is found that in the different Asylums and Infirmarys of the State there were five hundred and forty-nine epileptics, six hundred and forty idiotic and one hundred and forty-one deformed. It is not difficult to see that epilepsy, idiocy and deformities are usually the work of syphilis due to hereditary or congenital transmission. This population of epileptics, idiotics, and deformed, constituted an element which was distributed in the different Institutions of the State, and was in custody as paupers. All these Infirmarys and Asylums entailed an expense for the State of \$680,657.08.

It is astonishing that in all the reports of the State Institutions⁴ syphilis is not mentioned. We looked over the report of Athens State Hospital, Ohio School for the Blind, Toledo State Hospital, Ohio State School for the Deaf, Ohio Institution for Feeble-minded, Ohio Hospital for Epileptics, Girls Industrial Home, Masillon State Reformatory, and many others, and syphilis, as a cause of these defects, could not be found mentioned even once.

In the Hamilton County Infirmary, where we have sent incurable patients with ulcerated gummata and osteochondritis, no diagnosis of syphilis can be found.

Yet we are more than satisfied that syphilis is at the bottom of most of those ailments, which cause the pauperism for which charitable institutions are crowded. Charity Organization Societies⁵ refer to drunkenness and sickness as the principal causes of pauperism and as responsible for the distress of 35 to 50 per cent. of all applicants for charity.

Syphilis is contracted every year by a large percentage of people, and it is well known that 75 per cent. of all cases of syphilis are brought on, on account of indiscretion, but in 25 per cent. the disease is taken accidentally, as Bulkley⁶ and others have clearly shown.

To have an idea of how many are infected with syphilis we are using

the statistics collected by Dr. S. Pollitzer and given in the transactions of the American Dermatological Association. These reports, however, are very deficient, because they give account only of eleven or twelve cities, and then solely of such cases as came under the observation of the members of that Association. They appear under the head of syphiloderma:—

1900.	2129
1901.	2995
1902.	2129
1903.	2744
1904.	2613
1905.	3153
1906.	2847
1907.	3644
1908.	3644
1909.	3661
Total.....	29,359

This means that in the last ten years the number of infected patients treated by the members of the American Dermatological Association amounted to 29,359 syphilitic patients in eleven cities: Boston, Buffalo, Chicago, Cincinnati, Cleveland, New York, New Orleans, Philadelphia, Washington, St. Louis and Montreal. This, however, represents only a fraction, when we think how many syphilitic patients are treated by their family physician, by advertising quacks, by druggists, by themselves, or are sent to Hot Springs. Moreover, every year it appears under the diagnosis of *ulcus* in over 500 cases, and as *ulcus molle* in over 400 cases. It is well known that *ulcus induratum* is the first manifestation of the syphilitic infection. It is the place where the inoculation of the syphilitic virus has taken place, and where the serum containing the spirochæta pallida has found its entrance. There is the place where the incubation is effected, and the spirillum of syphilis, which seems to be a form of protozoön, is developing and multiplying. It is the nest from which in forty or sixty days, millions of spirochætæ will start in the circulation in the lymph-vessels in the interstices of the tissues, to invade every organ and every tissue of the system.

Ulcus molle is positively non-syphilitic; it is only a local venereal ulcer, highly contagious, which after it has healed up does not leave any permanent trouble. But a great many times ulcers look like chancroids, are called chancroids, yet after twenty days tending towards cicatrization, the scar is somewhat hard, the lymph-glands are swollen and hard. This shows that it was a case of mixed chancre, which means that the diagnosis *ulcus molle* was accounted to one case of a true syphilitic initial lesion. In some of these cases the chancre is scarcely noticeable, so much so that the patients say that they had never had a chancre. But they say they had the bubo, as the gland nearest to the chancre gets hard and swells, and so remains for a long time without suppurating. In this case the

place of elaboration of the virus has been in the glands, and from there it has spread to the system. In some cases the gland may also suppurate, the suppuration is greater around the lymph-glands as peri-adenitis and the glands are really infected. These limited, incomplete statistics can only give a faint idea of the number of people who are infected with lues. Our interest in the matter will be greatly increased when we think that every one of these infected people must take treatment for three, four and more years. This entails a large expense to the individuals for treatment, and quite often loss of work, and loss of time resulting in further material financial loss. So far we have covered only those cases in which the individual can take care of himself, but when poor young men, who are living on their earnings day by day, are disabled, they must seek shelter in a hospital for treatment. In a great many instances the doors of the hospitals are found closed, and these poor fellows are turned into the street (dire irony), by those religious people who are preaching charity and asking contributions for charitable institutions. We have already dwelled on this subject in this JOURNAL, Vol. XVII., No. 3, 1910, when we pleaded for some interstate rules for the treatment of venereal diseases as a means of diminishing their diffusion. When thought is given to the fact that each individual is a possible active centre of contagion, we can realize what an appalling menace this disease not only may become, but actually is.

Any rule of any character which can stop the evil has to be accepted as the cheapest and the most humane. Ignorance, filth, disease, and poverty are the combined foes of civilization, and they lead unfortunately to pauperism.

Morphinism and cocainism in many instances are among the consequences of syphilis. The man who is troubled at night with pains—*dolores vaghi, dolores osteocopi chephalea nocturna*—and wants to have sleep, seeks relief, and his ultimate resort is to take morphia, or cocaine. This relieves him, he finds himself happy to have the means of relieving his pain, and of obtaining some sleep. One of our best physicians, who died a few years ago in performing a surgical operation, was accidentally infected with syphilis. The initial lesion began under the nail of the third finger of his right hand. When he came for an examination, his body was covered thickly with syphilitic roseola. He treated himself with only potassium iodide at different intervals. A short time after, he began to complain of *la grippe*. All his pains due to the deleterious action of syphilis, he attributed to *la grippe*. Whiskey and morphia were the remedies he chose so as to diminish these sufferings. The hospital was the only place where he could be cared for.

From our experience of many years in the hospitals we can state that syphilis is more prevalent in the lower classes of society. Syphilis combined with poverty makes a heavy burden, and to bear both of them it is excessive and unnecessary. Poverty and sickness form a terrible part-

nership, which add misery to the poor. The man afflicted with syphilis is at another disadvantage, he must bear his sufferings in silence, trying to conceal his sickness. He tries his best to continue his work, knowing that if he stops work misery will result.

Cause.—To the spreading of syphilis contributes a great deal the idea of vagrancy. The vagrant in winter remains in the large centres of population, moves from one lodging house to another, and in summer he goes to the country. These nomadic vagrants frequent special districts of the cities, which are usually patronized by the rough elements, called *town bums*. In these districts vice flourishes, as for example in the Tenderloin district in New York, South Clark street in Chicago, red-light district in Cincinnati, etc. There are small hotels, gambling houses, houses for the sporty elements of different grades according to the class of people who patronize the places. In these districts are found single men and single women, who have no matrimonial ties or disregard them. The men patronize saloons and lodging houses, and the women crowd dance halls and brothels. Young men from the country seeking work, poor clerks who seek a place where they can live cheaply, emigrants trying to find employment, come in contact with these elements, and naturally they get vicious, and in many cases acquire venereal diseases, adding sickness to poverty.

The vagrant class is usually recruited from the unemployed, they have no ambition for work, are usually suffering from ravages of venereal diseases, or from chronic ailments which are the result of syphilis. They form a class of indigent and infirm. They cannot, nor do they want to find employment; they are usually dependent and are not capable of being restored to usefulness and independence. Their life passes from the saloons in the slums, to the workhouse, from the workhouse to the hospital, then finally to the City Infirmary. This miserable condition is entirely due to vice, which has made them its victims, either by accident or by evil home environment.

Overcrowding is the cause of great evil. It has been demonstrated that pauperism, immorality, perverted sensuality, drunkenness and debauchery are in many instances caused by overcrowded tenements. Debauchery is in many cases the cause of syphilis, which, as a contagious disease, is found more abundantly in overcrowded districts. In the tenement houses there is to be found promiscuous mixing of different ages and sexes in a single room, which removes the sense of modesty and brings about corruption of the young people.

Prevention.—An approximate estimate of the cost to the community of the diseases caused by vice is hardly possible, but it is certain that it is a heavy burden. In the same way, the sufferings and the financial losses caused by these diseases to working people cannot be definitely calculated.

It is, therefore, a dire necessity to establish preventive measures to avoid syphilis, and society has the power to adopt them. This would

require the combined efforts of parents, of society, of clergymen, of physicians, of teachers and of the municipal authorities. The combined work may one day be rewarded with satisfactory results in the prevention of inebriety and in the prevention of syphilis and venereal diseases. The necessity of prevention and of special treatment has been so well felt and so well commenced against tuberculosis, that we sincerely hope that the same interest will be taken for the prevention of the hidden scourge of society.

It is a matter of incalculable importance for society in general and for the community in particular to preserve the productive forces instead of losing them. Prevention, and prompt treatment of syphilis can save great sufferings and heavy expenses. It is much cheaper to treat syphilis promptly and thoroughly than to leave infected people uncared for, and thus wait until the affection becomes a permanent infirmity with the consequent disability.

Preventive measures for diseases are indeed economical. These we would formulate in four paragraphs as follows:—

(1) Instruction and education, increase the standard of morality and inculcate high respect for the women.

(2) Diminish the overcrowding in the tenement houses. In factories and establishments where girls and boys are employed, rules of strict respect for each other must be enforced.

(3) Those who have been infected with syphilis must be treated. Hospitals have to take care of venereal patients, and dispensaries have to be within easy reach of everybody.

(4) Prostitution must be under municipal surveillance, and infected prostitutes must not be allowed to remain at large, but must be confined in hospitals and kept under treatment until the manifestations of lues are no longer dangerous for transmission.

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THE SANITARY SUPERVISION OF PROSTITUTES.*

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The Sanitary Supervision of Prostitutes, as provided for in Clause 79 of the Page Bill, has a most important interest to the members of this Society. The specific object of this Society's organization is to limit the spread of diseases growing out of the social evil. As stated in Article II. of its Constitution, it proposes to study every means, educational, sanitary, moral and administrative, which promises to be most effective for this purpose. It is eminently fitting, therefore, that we should study the preventive value, probable or presumptive, of this measure. If it promises to be effective in limiting the spread of venereal diseases, it should receive the endorsement and support of this Society. If, on the other hand, it should appear, upon examination, that it possesses no real efficacy as a preventive measure, and, moreover, has certain countervailing disadvantages which are calculated to work harm rather than good, this Society should endeavor to secure its modification or repeal.

While the purpose of this law is to a certain degree corrective and punitive, its essential intent as I understand it, is sanitary, and I shall consider it chiefly from this point of view.

Before examining in detail the practical working of this sanitary scheme, it may be well to survey the character of this legislation from a more general standpoint.

In the first place, it marks a new departure; in all previous legislation in this State dealing with the social evil, the diseases it engenders have been considered a negligible quantity and entirely ignored. This bill has the merit of recognizing the existence of these diseases, their significance as a danger to health, and the necessity of instituting measures to suppress them. The important question to be determined is whether the policy proposed represents advanced or retrogressive legislation.

As most of you are aware, opposition to this measure has developed in certain quarters, owing to the impression that the medical inspection of prostitutes is intended as an opening wedge to the State regulation of the social evil. This inference was, perhaps, legitimate in view of the fact that the statute is almost identical with that of the Continental System of

*Read before the American Society of Sanitary and Moral Prophylaxis, November 10th, 1910.

Reglementation applying to the arrest of professional prostitutes and the medical examination of these women who, if found diseased, are remanded to the hospital for treatment until cured. Under the French law, amended April 11th, 1908, these provisions do not apply to girls under eighteen years of age. If they are arrested by mistake, they are immediately discharged, even if found diseased. While the measure under consideration is free from the odious feature of license, its administration carries with it the disgrace of a public trial, finger print impressions, etc., which are peculiar to our system of judicial procedure. It is more oppressive in that it permits a longer sentence to the hospital.

There is no suggestion that this legislation is reformatory in its purpose. Certainly no one familiar with the demoralizing influences and associations of a female venereal ward could be persuaded that they conduce to reformation of the woman or her restoration to a respectable, decent life. No prostitute was ever reformed by punishment. Its only effect is to render her more callous and confirm her in her nefarious calling. And yet, the class of women who chiefly fall under the provisions of this act are more likely to be the debutantes in vice, who are more susceptible to reforming influences. All medical experience is to the effect that the younger the woman the more apt she is to be found diseased.

This legislation is not intended in the interests of the diseased women themselves, unless we ascribe to the State an exaggerated paternalism which would supply skilled examiners and prolonged support and hospital treatment at the public expense, the economic cost of which would be considerable. Evidently it is in the interests of the men these women might infect.

The most distinctive character of this bill then is that of class legislation; speaking broadly, it is based upon sex. It is directed against a particular class of women for the protection of a particular class of men. Not the good citizens who lead regular lives, and to whom the prostitute with her cortege of infections carries no menace, but for the protection of the licentious class of men who seek these women for immoral purposes. Nothing could be farther from my idea than to intimate that the excellent men who are responsible for this legislation had any such purpose in view, but we are considering the practical operation of this law, and not the motives of those who framed it. It is to be borne in mind that venereal diseases are differentiated from all other infectious diseases by the peculiarity that they are commonly contracted through the voluntary act of the individual. Venereal disease seeks no man, it must be sought for in order to be acquired; with the exception of accidental and innocent infections it can only be acquired through an act which is qualified as immoral: it may easily be avoided by refraining from that act. Now the important question arises whether the State is under obligations to protect men from disease who are amply able to protect themselves simply by avoiding exposure to probable or certain sources of contagion. The State

cannot consistently make safe provisions for the gratification of man's sensual impulses without recognizing the doctrine that sexual debauch is a necessity for men.

Sweeping aside these conditions, the advocates of this measure may say: Let us be practical; prostitution has always existed; it always will exist; let us accept the situation as we find it. Men will consort with prostitutes, why not afford what measure of protection we can. Common sense would indicate that if these diseased women are returned to the streets they will infallibly infect a certain number of men. If they are isolated in the hospitals and cured, this given number of men will escape.

This conclusion by no means follows. It is infinitely more probable that these men with immoral tendencies will seek other prostitutes and be contaminated just the same; the supply of infectious material is always amply sufficient.

"But at least you will admit," they say, "that if one hundred or five hundred diseased women are sent to the hospital and cured, the number of active foci of contagion will be numerically reduced by just so many." Unfortunately the sum does not work out that way; it involves addition as well as subtraction. If a certain number of the inmates of disorderly houses are withdrawn, the revenue of these houses is correspondingly diminished. Commercial instinct would prompt the keepers of these houses to apply to procurers, to white slavers, and to other agencies for a new supply of women to take their places. These new recruits are speedily infected and the number of active foci of contagion is augmented rather than diminished. The supply of these women is always created to satisfy the demand. Such is the history of this vile commerce the world over.

Coming now to the practical workings of this sanitary scheme: In the administration of this law the police agent furnishes the testimony which convicts the woman of prostitution, and the physician furnishes the evidence necessary to convict her of disease. The consignment of the woman to the hospital is dependent upon the verdict of the examining physician, and her discharge from the hospital upon the certificate of the attending physician that she is cured. The physician acts as the judicial officer, the magistrate having no authority in the matter.

Medical Examination.—Now, the law, in requiring a *prompt* report from the examining physician as to whether or not a prostitute is diseased demands what medical science and skill are utterly unable to furnish. While it may be comparatively easy to recognize the presence of acute gonorrhea, these women, for obvious reasons, seldom practice their vocation with the disease in this stage; the vast majority of infections originate from chronic or latent gonorrhea. When the disease is localized in the deeper organs, the clinical evidence and bacteriological proof of its existence are exceedingly difficult or impossible to establish, and yet the disease may be actively contagious. The testimony of all specialists is concurrent upon this point,—that in these cases it is impossible to de-

termine with certainty the presence or absence of contagious elements. Neisser, the discoverer of the gonococcus, examined five hundred and seventy-two public women of Breslau. By the ordinary examination he found a discharge suspicious of gonorrhea in only twenty-two. By a more careful and thorough examination, he found that two hundred and sixteen of these women were indubitably gonorrheic or probably so. In fifty-seven of the others the contagious elements were not demonstrated but were regarded as suspicious. Professor Ehlers, for many years physician to the police, (*Bureau de Moeurs*) in Copenhagen, declares that a negative certificate has no positive value.

Nothing is easier than the diagnosis of syphilis in the active stage of secondary eruption; but syphilis is not a disease of continuous symptoms. In the intervals between the outbreaks, when the disease is in the contagious stage, there may be absolutely no evidence of its existence, yet there may be an explosion of contagious elements a few days thereafter. Then again, it is often difficult to distinguish between the eruption of syphilis and that of many common skin diseases which it simulates. The Wassermann test to discover the presence or absence of syphilitic elements in the blood, while most valuable, cannot be absolutely relied upon. It may be negative when the disease is undoubtedly present; it is frequently positive long after the individual has ceased to be contagious, so that after all we must rely upon the clinical evidence.

Commitment to the Hospital.—One obstacle in the administration of this law which our legislators did not foresee is the lack of adequate provisions for the treatment of this class of patients in the public hospitals of this city. There is not a single hospital on Manhattan Island which receives and treats venereal patients, the city provides only 26 beds in the City Hospital for female venereal patients, and about the same number in the Metropolitan Hospital, both on Blackwell's Island; the King's County Hospital and the Long Island College Hospital have each about twenty-five beds for this class of patients. In the existing organization of our hospital system there is not accommodation for one in five hundred of the prostitutes in this city. As a result of these inadequate provisions, the diseased women who have thus far been sentenced to the hospital under this law, have been confined in the cells of the Workhouse, which it is needless to say, is in direct violation of the express provisions of the statute. In this connection I may state that I have repeatedly called attention to the shameful and notoriously inadequate facilities for the hospital treatment of venereal patients in this city. About the only good I see in this law is that it may compel the authorities to correct this abuse.

I understand that arrangements are now being made to accommodate a limited number of these women by opening up a ward of forty beds in the City Hospital. But this evidently will suffice for only a small percentage of diseased women who will be sentenced under this law, if it is

honestly enforced. A legal measure is, to say the least, ill-considered if it requires impossibilities of the public functionaries who are to administer it.

What will be the effect on the City Hospital so far as its future efficiency is concerned? We should not lose sight of the fact that the moment a hospital begins to serve as a house of correction or a penitentiary a stigma is placed upon it which repels other patients. You may not be aware that the City Hospital was formerly known as the "Penitentiary Hospital," to which venereal cases were committed by the courts for treatment. Other patients refused to go there. The name was changed to the "Island Hospital," then to the "Charity Hospital," but its sinister reputation clung to it. It was finally changed to the City Hospital. It required nearly two generations for it to live down its unsavory reputation. Why repeat this experience?

Cure.—Now as regards hospital treatment and cure, it may be said that in the light of our present positive knowledge of the prolonged contagious activity of syphilis for years, and that of chronic gonorrhea, which may persist indefinitely, the assignment of a time limit for the cure of these diseases is unwarranted. The contagious laws of these diseases do not lend themselves to legislative enactments. The treatment of chronic gonorrhea in women is the most difficult and prolonged in medical therapeutics. Many cases cannot be cured without the removal of the deeper organs in which the germs find lodgment. If a woman is cured, she may be reinfected an hour after she leaves the hospital. Syphilis cannot be cured in one year, two, or even three years, and in many cases the disease is contagious during a much longer period. These cases may be whitewashed—that is cleared up of existing manifestations, but they are not cured. Time and time again in my twenty years experience in the City Hospital I have discharged syphilitic women free from every manifestation of the disease. They have returned in a short time, it may be a week or a month later, in as bad a condition as before; alcohol and dissipation promptly determine a new explosion of contagious elements.

In appreciating the value of the medical examination and hospital treatment of these women, it is well to weigh the results of the observation and experience of skilled specialists abroad where this system has been in vogue for a long period. Janet, the recognized highest authority on gonorrhea in France, and an ardent advocate of regulation, declares that the attempt to eliminate cases of gonorrhea by medical inspection and treatment in the hospital is like pouring water through a sieve. He, therefore, urges that the medical examination and isolation of these women be applied only to syphilitic cases. According to this authority, all prostitutes have gonorrhea,—in most of whom it exists in a torpid state without inflammatory reaction. He says: "In my opinion, if you wish to lock them up for that, it is necessary to lock all of them up." Another authority thus phrases it: "Why examine prostitutes for gonorrhea. They

all have it; we know in advance that they do. It is no less useless to cure them, since they are destined to receive every day their dose of gonococci."

Admitting for the sake of argument that the enforcement of this law is in the interest of the public health, if the principle be sound, if it is to be adopted as a settled State policy, why stop at half-way measures, why limit its application to the comparatively few women apprehended by the present haphazard and capricious methods of police intervention? Why not extend its advantages to the inmates of disorderly houses and the great body of prostitutes in the city, who according to the best medical testimony are practically all diseased. If it be a good sanitary procedure, the more thorough its application, the greater the protection to the public health. Why not adopt the vastly more comprehensive system of medical inspection employed in continental countries, which involves weekly examinations of all prostitutes who can be brought under police control, with the view of promptly weeding out sources of contagion as soon as detected.

Owing to inherent defects failure has been largely writ upon this system to limit disease. It is defective in that the medical examination fails to detect disease, the detention in the hospital is insufficient for a cure, the syphilitic cases are simply whitewashed and the gonorrheal cases, if cured, are incessantly reinoculated. In countries where it has been most perfected and employed, it has been condemned by its practical results. Fournier, its most distinguished advocate, says: "It does a little good, but it does not diminish the sum total of venereal morbidity." It is proper to state that Fournier believes that the inmates of disorderly houses who are closely subjected to sanitary supervision furnish the "minimum of nocuity," so far as contagion is concerned. This may be explained on the ground that the majority of these women are the older, more seasoned prostitutes who have been infected with syphilis at an early period of their career, have passed the contagious stage, and therefore cannot communicate syphilis, while those affected by gonorrhea have been instructed in the use of antiseptic douches and other preventive measures, so that they are less liable to communicate their disease. All experience shows that the younger the prostitute the more dangerous she is as the source of contagion.

Dr. LePileur, for fifteen years chief of the St. Lazare Hospital, says: "We receive every year more than one thousand of these women; about five hundred are new cases; more than one-half are the *réentrants*. They are arrested and sent back some two or three or even ten times during the year for recurrences of their disease." So that there is a constant procession of these women from the streets to the hospital, back to the streets, and again to the hospital. Of interest in this connection is the fact that of 56,196 arrests of women by the *Police des Moeurs* in a single year in Paris, this number embraced only 5,776 different women,—averaging more than 9 arrests to each woman.

One incidental bad effect which is inseparable from the operation of this measure should be noted. In the estimation of the public not only every woman discharged from the hospital—but, also every woman who successfully runs the gauntlet of the medical examination,—is regarded as safe. The failure of the medical examiner to detect disease is accepted as a guarantee of a clean bill of health. By thus furnishing what may be an illusory sense of safety, it cannot fail to act as an incitation to debauch.

The advocates of this measure may, however, say: "Why not 'try out' this plan? Why condemn it in advance? It is yet only in the experimental stage." To this it may be replied that it has already been tried for over a century in European countries, and has been abolished in many of them. As a matter of fact, no other plan has ever been seriously tried.

The germ of this idea may be found in the prescription of a famous medical ecclesiastic soon after the irruption of syphilis into Europe at the close of the fifteenth century. "Over 400 years ago, Gaspard Torella, who was Bishop Saint Just (Sardinia) and physician to the famous Caesar Borgia, promised to suffering humanity the eradication of syphilis in the following words: 'The *Mal Français* may be exterminated with the aid of Almighty God and the Sainted Mother, Virgin Mary, if the Pope, the Emperor, the Kings and all other Princes will delegate the *matrones* to search out this malady and examine the public women, who should be isolated if they are found diseased, in a place to be especially indicated by the Prince, to be there submitted to medical treatment.' " (Ehlers.)

Notwithstanding the advances made in sanitary science and its brilliant achievements in the conquest of other infectious diseases,—this sanitary scheme serves as the model of all subsequent methods of dealing with these diseases. In spite of the accumulated experience as to its defects, and its failure, we still cling to this puerile and at the same time superannuated policy. I say superannuated, because while there may have been some justification for this policy when the opinion was held by the medical profession—as it was up to fifty years ago—that the contagion of syphilis began and ended with the chancre and that chronic gonorrhea was not contagious,—in the light of our present positive knowledge of the prolonged contagious activity of both these diseases and their contagiousness after apparent cure, the continuation of this policy is absurd.

When this prescription was given, syphilis was comparatively circumscribed; since then, it has invaded all civilized countries and is now practically world-wide in its extension—and by what agency? Evidently the naïve ecclesiastical physician overlooked the male factor in the spread of disease—the men who have carried civilization into new countries, have carried with them this sinister gift which infects and decimates the natives.

Now it may be considered foreign to the consideration of this bill to introduce that *other factor* in this discussion, but there can be no just appreciation of the value of a sanitary measure for the control of infectious

disease which does not take cognizance of the factors in its spread. The fatal defect of every sanitary scheme to control venereal disease has been that the masculine spreader of contagion has been entirely ignored as mythical or practically non-existent; the woman has been regarded not only as the chief offender against morality but the responsible cause of disease; all repressive measures to stamp out the diseases of vice have been directed against the woman alone.

This brings us to a brief consideration of the relative responsibility of these two factors. It may be positively affirmed that the male factor is *par excellence* the disseminator of venereal disease. He is chiefly responsible for its social consequences, and it is scarcely necessary to say that the social dangers of these diseases, their injury to the family, their significance as a racial danger, far transcend their injury to the health and life of the individual. The prostitute is but the purveyor of the infection; she returns to one or several consumers the infection she has received from another consumer; her pathogenic activities are confined to the field of immorality; while in this field she is undoubtedly the more active spreader of contagion, she rarely invades the habitations of virtue. It is her partner who carries the poison home and distributes it to his wife and children. He is directly responsible for the vast mass of disease engendered in the family,—the invalid and mutilated women, the sterile households, the blind children and the physical and mental weaklings, the defectives, which make up the hereditary horrors of syphilis. That he does this most often through ignorance does not alter the consequences.

If we are to make a just partition of responsibility for the spread of venereal diseases, let us be honest and decent about it. To paraphrase a sentence of the illustrious syphilographer, Dr. Charles Mauriac: Men infect women, but they do not wish to be infected themselves; in order to indulge their pleasant vices safely, they demand sanitary guarantees of women, but they offer none themselves—they pose as victims, while evading any responsibility for contagion, in defiance of the most elementary equity—this is the whole situation in a nutshell.

I have dwelt upon the responsible role of the male factor in the spread of venereal disease because there can be no intelligent or comprehensive scheme of prophylaxis devised which is unilateral in its workings. No Sanitary Bureau, no Health Board could stultify itself in attempting to control any infectious disease by isolating the female factor, while allowing the male factor to scatter broadcast the seeds of disease unfettered by a shadow of control. It would be a satire upon sanitary science, a travesty upon sanitary methods, an anachronism in the present advanced stage of preventive medicine.

The advocates of this measure may say: "If diseased prostitutes were retired from circulation and isolated until the contagious elements are sterilized by treatment, men would not be infected and they would not carry the infection into the family." But the cause of the evil lies deeper;

it is rooted in the physiological fallacy of the sexual necessity for men, the belief—fortified by generations of heredity and training,—that a man has a natural, unassailable right to indulge his sensual impulse as he pleases, and that the general principles of morality do not apply to his sexual conduct.

The double standard of sanitation has its exact counterpart in the double standard of morality; both spring from the same sentiment, or rather, the former is the direct outgrowth of the latter. Human society may construct a conventional code of morals to conform with its sensual inclinations, but the morality taught by science is more rigorous: the laws of infectious disease cannot be traversed or set aside to conform to an arbitrary discrimination based upon sex. Science recognizes the absolute equality of men and women before infection, as a logical conclusion; there should be equality of the moral law for the two sexes, equality of responsibility for diseases growing out of a violation of that law, equality of sanitary measures for their repression. It may be said that this idea is utopian and utterly unrealizable, but, in my opinion, it is the only key to the successful solution of this problem of prevention.

In my opinion, the tide of immorality which sweeps the country will never be stayed, so long as we hold to the ethical heresy that one-half of humanity has imperious duties that are not binding on the other half. The pestilential wave that follows in its wake, carrying the wreckage of the health and lives of innocent women and children will never be checked, so long as we hold to the sanitary fallacy that repressive measures should be applied to only one factor in the spread of disease.

Finally, another aspect of this legislation may be referred to: I am informed that this law meets with the approval of the magistrates, as it enables them to deal more effectively with disorderly women. Simply imposing a fine or sending them to the Workhouse for thirty days, it is claimed, does no good,—the object is to make the life of these women as hard and difficult as possible. No one will deny that in the interests of public order and decency every open manifestation of vice should be rigorously suppressed. The enforcement of this law may drive these women into temporary seclusion,—they do not like to be registered as criminals or subjected to prolonged imprisonment,—but the volume of vice and disease is not thereby diminished; it is simply diverted into other channels. If this legislation is intended to enable the magistrate to impose a heavier sentence than is now permitted under the statute applying to "vagrancy," the obvious remedy is to change the statute and not to invoke the intervention of the Health Department for such purpose. The extraordinary power over the liberty of the individual vested in the Health Board was intended to be used solely in the interest of the public health; it cannot be legitimately exercised for punitive purposes,—neither is it the function of the public hospital to serve as a house of correction.

It is evident that the more effective this law may prove as a police

measure the more defective it must be as a sanitary measure. Harsh punitive measures when applied to the treatment of contagious diseases always defeat the object in view, which is to treat as many cases as possible and not to drive them into concealment.

In expressing my honest conviction that this measure is unwise in its conception, defective in method, and possesses no real efficacy in the protection of the public health, I am by no means an advocate of sanitary nihilism. But if the State is to make any attempt toward the repression of venereal disease, let it be intelligent, comprehensive, and impartial, based upon sound scientific principles and sane sanitary methods. Let it not resort to a unilateral measure which has been condemned by its practical results elsewhere and is foredoomed to failure.

In the Chairman's report of the Committee of Seven, appointed by the New York County Medical Society in 1901, I advocated placing venereal diseases on the same plane of sanitary control as other infectious diseases dangerous to the public health, the entering wedge to this control being the obligatory notification of these diseases, under specified conditions, with due regard to their shameful character in popular estimation. Difficulties would doubtless be encountered just as in the case of tuberculosis, but they could be dealt with as they arise. Opposition to this measure would be largely disarmed by the assurance that this information would be kept secret by the sanitary authorities.

This policy is advocated with a full recognition of the fact that the prevention of these diseases is not purely a sanitary problem, and that we cannot successfully cope with this great social scourge by sanitary measures alone. They must be reinforced and strengthened by influences and agencies which can more effectively intervene in the correction of the causes of prostitution. Many of these causes lie entirely without the sphere of sanitary control. All experience shows that no communicable disease which is spread in the relations of family and social life can be successfully controlled without the intelligent coöperation of the public.

First of all the antiseptic principles of publicity should be applied to these diseases, the public should be enlightened as to their extent and their dangers,—both to the individual and to society,—and the laws of their contagion. Publicity of these evils is the first requisite; the public must recognize their existence and understand their significance in order to create a public opinion which shall sanction and sustain all measures adjudged necessary by the sanitary authorities for their effective control. I believe that the coöperation of the public waits upon this enlightenment.

The educational campaign inaugurated by this Society has not been confined to enlightenment of the public; it has been chiefly directed to the far more fundamental and radically effective work of educating the rising generation in the laws and hygiene of sex; to substituting sound, scientific, and wholesome knowledge for the sex instruction that the majority of young people pick up from ignorant and often vicious sources;

to the creation of a right mental attitude toward sex and sex relations; to the correction of certain physiological fallacies which constitute the strongest subjective stimulants to sexual debauch; and to enlightening young men as to the dangers, physical and moral, which result from irregular living—dangers which may have upon their future wives and children all the consequences of crime.

66 West 40th Street.

THE SCAPHOID SCAPULA SYNDROME; ITS CONNECTION WITH SYPHILIS IN THE ASCENDANTS.

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My observations have shown the scaphoid scapula to have far-reaching significance in the problems of heredity; to have unmistakable clinical



FIG. I.

significance and to be an anatomical entity. My studies of skeletal, embryo and monster scapulæ have shown that the scaphoid scapula, as a type, differs from the average scapula of the human race in several anatomical particulars, chief among which is that the vertebral border below the scapular spine is more or less concave—hence the name.* (Fig. 1.)

*The Scaphoid Scapula, a Frequent Anomaly in Development of Hereditary, Clinical and Anatomical Significance, *Medical Record*, May 21st, 1910.

Observing this type of scapula for the first time in September, 1906, in a seven-year-old epileptic boy, and later in his younger brother and sister, and in his mother, I have noted it many times since then, in the course of routine physical examinations. My observations warrant the prediction that studies by others will verify and establish the relative frequency of this anomaly in the population of cultured and civilized countries, and its very great frequency among backward and defective children, among epileptics, among the insane and among the so-called incorrigible and criminal classes.

Observing when the scaphoid scapula is found to a rather marked degree it is almost invariably associated with other anomalies, either physical or psychical or both, I have thought of it and now consider it merely one manifestation of some disturbing factor affecting the whole organism in its earliest development. I have found that it occurs in whole families, that it is transmitted from parent to child and so on through several generations, and that it is present in a varying degree in a large percentage of our population. The frequent occurrence of the scaphoid scapula in all branches of society seems to postulate a common cause and one sufficiently potent to modify the development of the growing organism from its very foundations.

From these observations and considerations and from my anatomical studies, I came early to the conclusions: (a) that no assumed circumstance in the life of the individual after his birth could give him the scaphoid scapula; (b) that its occurrence could only be accounted for by the assumption of some abnormal circumstance—some disturbing factor operating in the parents or in the more remote ascendants. Searching for the nature of the disturbing factor in certain individuals who have scaphoid scapulæ, I have found in them, in addition to disharmony in physical and mental development, definite physical signs, first and foremost of which is the presence of arterial changes, sclerotic changes, which we all recognize as keeping pace with advancing years after the fortieth year of life. But in certain individuals having scaphoid scapulæ, such changes appear much earlier than in average individuals, in some discernible by the ordinary methods of clinical investigation as early as the fourth and as a rule as early as the tenth year of life and in older individuals to a degree out of all proportion to their years. In such individuals I have also found with great frequency an abnormal degree of lymph gland palpability and the histories of catarrhal affections developing in early childhood and persisting for many years. During the earlier periods of life, many of these individuals have adenoids, not a few develop simple enlargement of the thyroid gland and some of them have nocturnal incontinence. Most of these clinical signs and conditions, as well as some others which I have learned to consider correlations of the scaphoid scapula, have been considered at some length in a recent article.*

*The Clinical Recognition of the Scaphoid Type of Scapula and of Some of its Correlations.

Aside from the chief correlation of the scaphoid type of scapula, namely, the deviating characteristics of the whole individual, the most constant, and, to my mind, the next in importance in certain of these is the presence of arteriosclerosis at unusually early periods of life, and in older individuals to a degree out of all proportion to their years. It was my recognition of early vasculosclerotic changes in certain individuals having scaphoid scapulæ which ultimately led me to the determination of one disturbing factor underlying the origin of this anomaly. Of the various causes, any one of which may so operate as to engender arterial changes in the individual, alcoholic and metallic poisons are considered pre-eminent. So far as I know, no one of these causes alone so affects the individual as to bring about even a tendency to arterial degenerations in his offspring. Furthermore, the conditions with which the scaphoid scapula is frequently found to be associated and its occurrence in all branches of society readily exclude any one of these factors as being the underlying cause.

There is but one disease known to me which permeates all branches of society; which may be transmitted from parent to child; which causes vasculosclerotic changes in the affected individual, as well as in his progeny, and that disease is syphilis. Syphilis is preëminently a vascular disease. Its pathology centers about its vascular manifestations. Whether the *spirochæta pallida* so affects the vessels in the growing embryo as to bring about disharmony in development, of which the scaphoid scapula may be only one manifestation, or whether this and other manifestations may be the result of its toxic products upon the germ plasm, I do not know. But that there is a strong connection between the occurrence of the scaphoid scapula in the offspring and syphilis in the parents or in the more remote ascendants, I have in my studies been able to demonstrate beyond all question.

Permit me to direct your attention to some known but not always appreciated facts which from the accumulated study of syphilis may be considered established, and to some personal observations bearing upon this connection. Of the very great number of our population who contract syphilis, only a few suffer from syphilis of the nervous system, tabes and general paresis. Nevertheless, syphilis of the nervous system, tabes and general paresis are believed by many observers to be becoming more frequent in our population, the latter making up an increasing percentage of the inmates of our hospitals for the insane. It is a matter of common observation that those who suffer from syphilis of the nervous system, tabes and general paresis are, as a rule, free from decided evidence of a former luetic infection as pertaining to the bones, skin and mucous surfaces. But that they frequently show a degree of vasculosclerotic changes beyond their years is not sufficiently recognized.

It is a matter of common observation that the malignant forms of syphilis, particularly as affecting the skin, bones and mucous surfaces are becoming yearly less frequent. My personal observations indicate that the

decided surface manifestations, as well as the malignant forms of acquired syphilis, are relatively infrequent in individuals having scaphoid scapulæ, and that in individuals suffering from tabes, general paresis, and syphilis of the nervous system, scaphoid scapulæ are frequently found.

May not the infrequency of malignant syphilis indicate that our population is acquiring a relative immunity from such forms because of the general syphilization of the race? May it not be that the gain in the infrequency of the surface manifestations of syphilis is more than balanced by the increased frequency of its later forms as affecting the deeper structures of the body and especially the nervous system? May not the presence of the scaphoid scapula in individuals suffering from the later and deeper manifestations of syphilis be an indication of its origin as well as of the individual's acquired relative immunity transmitted to him either from his parents or through them from his more remote ancestors?

Such observations, however, could never establish the origin of the scaphoid scapula, but they do seem to justify an inference of a strong connection between the occurrence of the scaphoid scapula in the offspring and syphilis in the ascendants. Now if this inference be well founded, we should find proof of it in our studies of the offspring of syphilitic parents; and we should expect to find proof not only in the study of such individuals as show the heretofore recognized signs of congenital syphilis, but in those we have heretofore considered free from every sign of hereditary "taint."

Our studies must not only apply to the individuals known to be of syphilitic parentage, but they must also apply to individuals coming before us in whom what may hereafter be called the scaphoid scapula syndrome is found. Not only must such individuals, their parents and more remote ascendants be studied from every angle, but the study must be made a comparative one. The individual presenting this syndrome must be compared with each member of his generation, with his parents, with his near relatives, when possible, with his more remote ancestors, and then the members of his generation must be compared, as far as possible, with other generations wherein syphilis has not existed in the parents.

Finally, all known facts in pathology bearing upon the recognition of congenital syphilis should be brought to bear in the study of individuals coming to section having scaphoid scapulæ, and especially upon the products of abortion. In such study there must be included the search for the *spirochæta pallida* and the determination of the vertebral borders in those embryos sufficiently advanced to permit of such a determination, and when possible, an attempt should be made to correlate the pathologic and bacteriologic findings with clinical data.

The heretofore recognized signs of congenital and so-called hereditary syphilis are relatively infrequent among the living children of syphilitic parentage. When these signs are absent, we have considered such children healthy or at least free from all effects of syphilis and we have

pointed to them as living examples of the triumphs of our therapy in the parents. Systematic and comparative studies of *all* individuals born of syphilitic parents will prove to anyone, who will take the time to make such studies, the fallacy of such conclusions. It is upon the evidence afforded by such studies that the final proof that syphilis is *one* etiological factor in the genetics of the scaphoid scapula must rest. Such studies on the part of many will, undoubtedly, broaden our conceptions concerning the evil effects of syphilis upon the offspring and at the same time determine the clinical worth of the scaphoid scapula syndrome.

Let us for the moment direct our attention to a composite picture of some of the physical and mental characteristics of individuals born of syphilitic parents and of their descendants and to some of the conditions and diseases to which my studies of such individuals have shown them to be peculiarly susceptible. Confining our studies in the beginning to individuals of the second generation, we shall find many of these to be of retrograding and deviating types. As a rule, these individuals will show, when studied in a comparative way, deviation in physical or mental characteristics and frequently in both.

Among such progeny with relative frequency will be found many of the heretofore recognized anatomic, physiologic, psychic and psychoneurotic stigmata and with great frequency the scaphoid scapula with its chief correlations in varying degrees. Such individuals are usually undersized, have sluggish attitudes, meagre musculature and are strikingly lacking in the harmonies of physical development. They range in stature from dwarfs to giants, but whether the one or the other or merely undersized, disharmony characterizes their physical development. Many of them, apparently physically normal at birth, in their later development show retardation, or grow by fits and starts until near, either before or after, the usual age of puberty when they shoot up like weeds or forever remain stunted—blighted.

With the beginning of mental development, such progeny are either backward and remain so, or they show, and this is the rule, precocity. If disharmony characterizes their physical development, it is especially true of their mental development. They seem to have no childhood and to jump from the cradle to adolescence. "My children are all old in their ways" is a frequent expression of certain observing mothers and they may add "They are almost always ailing;" or the unobserving mothers (ignorance, mother-love and pride makes them so) may proudly say "My children are all healthy." Indeed, physicians usually consider such children healthy or at least free from syphilitic *blight* in the absence of "snuffles," eruption of the skin and mucous surfaces, bone and joint affections, Hutchinson's teeth, interstitial keratitis and deafness without otitis. Children of the second generation are, as a rule, older than their years. They are often ailing and are rarely very healthy. To appreciate

the truth of these assertions, we must, as physicians, study the individuals of families as well as the histories of individuals of families.

While idiocy, imbecility and backwardness are found in the second generation, such mental states are by no means common. My studies of individuals of the second generation show precocious mental development to be the rule. Not only do such children appear like little old men and women in the seriousness of their ways and actions, their preference for books rather than play and for the society of their seniors rather than their kind; but, as individuals, their facial expression is lacking in the freshness of infancy, childhood and youth and they ever afterward appear much older than their years.

Many of them develop sexual instincts long before puberty and these instincts are often gratified by masturbation, sexual intercourse or otherwise. Strenuosity and intensity characterize many of these individuals and before or after adolescence such mental proclivities, associated with an inherently weak constitution, may sooner or later lead to a "break" and they make up a large percentage of the cases commonly classified as neurasthenia, hysteria and dementia præcox. Many cases of epilepsy, chorea minor and tic are to be found among individuals of the second and later generations, but especially in the second, and I have been greatly impressed by the unusual frequency of tuberculosis in these generations.

If the antenatal mortality of syphilitic progeny is so great, it is but reasonable to believe that the influences underlying it are still operative in the living. If not the disease itself, its blighting influence as manifested by disharmony in physical or mental development or both, by inability to stand the stress and strain of ordinary existence, by lowered general resistance and by degenerative and involutional changes. Such progeny are truly abiotic; hence the instability of their natures, their proneness to so-called functional nervous and psychical disturbance, to degenerative and involutional changes, to tuberculosis and other diseases. Not a few individuals of the second generation, despite their handicap in physical and mental endowments, learning to adjust themselves to their environment lead successful, useful, and even brilliant lives, though they rarely live out their expectancy in consequence of their abiotic natures.

In my first communication* I referred to vasculosclerotic changes as a sort of connecting thread between the syphilitic and his progeny. In my studies of many individuals and families, upon which this communication is based, a degree of such changes out of all proportion to their years is the one preëminent clinical fact discernible in individuals who have acquired syphilis and it is the one significant clinical fact discernible in their children and in their children's children. It is probably one cause of the frightful ante-natal and post-natal mortality among such progeny

*The Scaphoid Scapula, a Frequent Anomaly in Development of Hereditary, Clinical and Anatomical Significance, *Medical Record*, May 21st, 1910.

and probably the main cause of their abiotic natures leading to lessened expectancy in life and to their proneness to disease, to degenerative and involutional changes, to the so-called functional nervous and psychical disorders and the underlying cause of tuberculosis in them—for is not the blood the life thereof?

Since we have been able to trace vasculosclerotic changes as a sort of connecting thread between the syphilitic and his progeny, our ability to recognize such changes is of prime importance in establishing one cause of the scaphoid scapula. So constant are these, even by the ordinary methods of clinical investigation, that they will be rarely missed in syphilitics two or more years after infection or in their progeny after the tenth year of life. As an aid to the usual methods in detecting arteriosclerosis, permit me to call your attention to Luedde's modification of the Zapski Binocular Corneal Microscope with which we may readily see the blood coursing through the conjunctival vessels, and when present the thickening and aneurismal dilatations of their walls. The almost constancy of vasculosclerotic changes and our ability to recognize them so early in life in individuals of the second generation warrant the deduction that these changes begin during development in utero. In other words, that many of such individuals are born with a degree of arteriosclerosis. Such in brief have been the observations, the considerations and the manner of research which finally led me to the conclusion that syphilis is one cause of the scaphoid scapula syndrome and which enabled me to formulate certain laws (*Medical Record*, May 21st, 1910), which seem to govern the origin and transmission of the scaphoid scapula.

In conclusion, permit me to say that I consider my deductions by no means final. That there may be other causes than syphilis which may so operate as to affect the germ plasm of parents, the nutrition or the development of the embryo and thus bring about the scaphoid scapula, other disharmonies in development, early arterial changes and other correlations seems possible. I have searched for these in vain. If investigation by others should lead to the verification of my findings and deductions and thus establish the connection between the scaphoid scapula in the offspring and syphilis in the ascendants, even in a few instances, the presence of this anomaly may serve as a clue to more than one medical mystery.

Before we may determine the significance of the scaphoid scapula syndrome in any individual, he must be studied from every angle and in a comparative way with the members of his own family and with average members of the community. With the use of modern refinements in clinical investigation; with the use of laboratory methods, merely to confirm and to control clinical deductions; with patient study of individuals and of the individuals of families on the part of many workers, the cause or causes, as well as the hereditary, clinical and pathological significance of this syndrome, may readily be determined.

My studies thus far warrant me in saying at this time that such research on the part of many workers will undoubtedly lead to more complete recognition of syphilis and of its blighting influence in the individual affected, in his children, and in his children's children. Out of such recognition let us hope a sane prophylaxis may be developed, whereby much suffering which now comes to humanity from this insidious enemy of the human race may in succeeding generations pass away from the earth forever.

Metropolitan Building.

MEDICAL AND SURGICAL PROGRESS.

EHRLICH'S "606."

A REVIEW OF THE LITERATURE SINCE OCTOBER, 1910.

By WM. ENGELBACH, M. D., of the Editorial Staff.

1. Alt: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1889.)
2. Bardachzi and Klausner: Ehrlich's "606" in Syphilis. (*Wien. klin. Wochenschr.*, No. 44.)
3. Citron: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1917.)
4. Dohi: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1893.)
5. *Ehlers: Fatality After Injection of Ehrlich's "606." (*Muench. med. Wochenschr.*, No. 42.)
6. Ehrlich: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1893.)
7. *Eitner: Blasenstoerungen und andere schwere Nebenerscheinungen nach einer Injektion von Ehrlich "606." (*Muench. med. Wochenschr.*, No. 45, p. 2345.)
8. Emery: The Preparation "606." (*Muench. med. Wochenschr.*, No. 45, p. 1543.)
9. *Fischer: Ehrlich's "606" in Syphilis. (*Med. Klinik*, No. 45.)
10. *Frenkel-Heiden: Die Anwendung des Ehrlich-Hata'schen Mittels bei Nervenkrankheiten. (*Berl. klin. Wochenschr.*, No. 45, p. 2048.)
11. Friedlaender: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1915.)
12. *Gaucher: Sur la valeur comparée de l'arsenic organique et du mercure dans le traitement de la Syphilis. (*Bull. L'Acad. de Méd.*, November 15, p. 264.)
13. Glueck: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1915.)
14. Gennerich: Erfahrungen ueber Applikationsart und Dosierung bei Ehrlich-Behandlung. (*Berl. klin. Wochenschr.*, No. 46, p. 2089.)
15. Grosz: (*Bull. L'Acad. de Méd.*, October 11, 1910, p. 180.)
16. Gruenfeld: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1911.)
17. *Hallopeau: L'hectine ou le "606" dans le traitement abortif de la Syphilis. (*Bull. L'Acad. de Méd.*, October 4, 1910, p. 130.)

18. Iversen: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, 1899.)
19. Lesser: Ehrlich's "606." (*Berl. klin. Wochenschr.*, No. 43.)
Marguelies: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1907.)
20. Michaelis: *Ibid.*, p. 1912.
21. Miekley: *Ibid.*, p. 1903.
22. Nagelschmidt: *Ibid.*, p. 1922.
23. Neisser: *Ibid.*, p. 1889.
24. *Orth: *Ibid.*, p. 1903.
25. Pick: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1924.)
*Ehrlich's "606" in Syphilis. (*Wiener klin. Wochenschr.*, No. 42.)
26. Polland and Knaur: Bericht ueber 50 mit Ehrlich-Hata "606" behandelte Luesfaelle. (*Wiener klin. Wochenschr.*, October 27th, 1910, p. 1521.)
27. *Riehl: Ueber Syphilisbehandlung mit Ehrlich's Heilmittel. (*Wiener klin. Wochenschr.*, No. 45, p. 1594.)
28. Rosenthal: Ueber "606." (*Berl. klin. Wochenschr.*, No. 47, p. 2137.)
29. Salmon: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1918.)
30. Schanz: Das Ehrlichsche Praeparat "606" bei Augenkrankheiten. (*Muench. med. Wochenschr.*, No. 45, p. 2344.)
31. *Schindler: Die Behandlung der Syphilis mit dem Ehrlichen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1922.)
32. *Scholtz: *Ibid.*, p. 1910.
33. *Stern: *Ibid.*, p. 1908.
34. *Treupel: Weitere Erfahrungen mit Ehrlich-Hata Injektionen, insbesondere bei Lues des zentralen Nervensystems, bei Tabes und Paralyse. (*Muench. med. Wochenschr.*, No. 46, p. 2402.)
35. *Uhlenhuth: Die Behandlung der Syphilis mit dem Ehrlichschen Praeparat "606." (*Deut. med. Wochenschr.*, No. 41, p. 1906.)
36. *Umfrage ueber die Wirkung des Ehrlich'schen Arsenobenzols bei Syphilis. (*Med. Klinik.*, No. 37.)
37. Volk and Lipschuetz: Die Behandlung der Syphilis mit dem Ehrlichschen "606." (*Deut. med. Wochenschr.*, No. 41, p. 1913.)
38. *Wechselmann: *Ibid.*, p. 1901.
Ueber oertliche und allgemeine Ueberempfindlichkeit bei der Anwendung von Dioxydiamido-arsenobenzol. (*Berlin klin. Wochenschr.*, No. 47, p. 2133.)
39. *Weintraud: Ehrlich's "606" in Syphilis. (*Med. Klinik.*, No. 43.)
40. *Willige: Ueber Erfahrungen mit Ehrlich-Hata "606" an psychiatrischneurologischen Material. (*Muench. med. Wochenschr.*, p. 2403, No. 46.)

A further study of the literature appearing on the subject of Ehrlich's new remedy, "606," since the last review [INTERSTATE MEDICAL JOURNAL for October], reveals a wealth of information issuing almost daily from investigators throughout the world. Perhaps no other discovery has created such universal interest as has been demonstrated by the in-

*The reviews marked with an asterisk contain the unfavorable results relating to the use of the drug.

numerable reports of the experimental research carried on with this "therapia sterilisans magna." The reason for this furor in medical circles is readily understood. A newly discovered drug, a single dose of which is lauded as a specific for one of the most general of infectious diseases, must necessarily be destined to receive such universal recognition. It is needless to say that the searching observations of so many investigators have developed many new phases which have an important bearing upon the use of this new remedy.

The earlier reports on the efficacy of "606" were so glowing that the action of this drug promised to be that of a harmless and magical specific. The reports communicated during the last two months demonstrate that there is a marked diversity of opinion, not present in the earlier writings, concerning the action and the application of this drug. Important problems appearing in these reports deal particularly with the specificity and toxicity of the remedy: the dosage, as to size, repetition, reaction and relation to conditions and different stages of the disease; newly undiscovered by-effects; technique of administration, such as menstruum and reaction of the preparation; and various methods of its introduction. The indications and counter-indications and the development of recurrences are important factors which have been given considerable investigation. The effect of "606" or a combination of arsenobenzol and other drugs upon other protozoal infections has also received some little attention.

It is not within the province of this review to attempt a solution of the many new problems which this therapy has introduced. For the sake of contrast, an analytical abstract of what are considered the most authoritative articles presenting both sides of this controversy has been essayed. Since this drug under the name of "Salvarsan" will soon be placed upon the market, the many conflicting reports concerning every phase of its usage should stimulate a continual, careful scrutiny of its actions and dangers as well as,—and this is more important,—discourage its indiscriminate exhibition.

The most noteworthy of the favorable communications was made before the Naturforscher Congress of German Scientists and Physicians at Koenigsberg. At this Congress Ehrlich, Neisser, Alt, Schreiber, Iversen, Wechselmann, Orth, and more than twenty-five other investigators, summarizing their personal experiences, discussed this new preparation from every point of view. Ehrlich recapitulated the more important facts deserving mention that have been made known since the introduction of his remedy, and added the more recent information that has appeared on that subject. He said the specific action of the remedy was recognized in animal experiments and was shown by the fact that on the application of a sufficient dose the spirochætæ disappear in twenty to forty-eight hours. If a longer time was required, either the dose was too small or the spirochætæ in question were immune to arsenic. The second fact which has developed was that specific antibodies are produced. Treatment with "606" furnishes an unusually favorable opportunity for the demonstration of these antibodies. The first important observation was that the milk of a mother, who was nursing a syphilitic child and was herself treated and cured with "606," had a most favorable action on the child. A similar result has been noticed in a large number of nursing women. The arsenic content of the milk is extraordinarily small, so that it was evident that the milk must contain antibodies which were received into the stomach of the child and absorbed. From other sources it is known that if the serum of such patients is injected into syphilitic children

the symptoms of the disease disappear. While it is evident that specific antibodies are formed, Ehrlich believes that the serum treatment alone is not sufficient for a positive cure, for, if of a thousand spirochætæ only a few survive, they are sufficient to prevent a complete cure. If children are injected with this serum, an immediate curative action is observed; the exanthemata very promptly disappear. But after six or seven days other disturbances develop, testifying that the antibodies are insufficient to destroy all the spirilla. It is, therefore, advisable to give such a child, soon after, a sufficient injection of "606" to kill the remaining spirochætæ.

The second specific action is the effect on the Wassermann reaction which is certainly concerned with the presence and growth of the spirilla. The very interesting observation has been made, that in certain affections a negative Wassermann reaction at first becomes positive under the influence of the injections. Thus, in chancres, at an early period, the number of spirochætæ is so small that they are not capable of producing a positive reaction. If the previously negative reaction is now at once converted into a positive one, evidence is furnished for the actual syphilitic nature of the disease. The importance of this reaction in the treatment with "606" cannot be sufficiently emphasized. If, in virtue of the therapeutic action, only 100 out of 1,000,000 spirochætæ survive, no reaction will occur, but every positive reaction is to be regarded as analogous to a relapse, and is, therefore, an indication for the repetition of the treatment with "606." Such cases should be examined at sufficient intervals and kept under observation. It would be very desirable if a modification of the Wassermann reaction could be made, so that the practitioner could apply this important test to his patients.

A third action which is very difficult to explain is that the remedy often works with wonderful rapidity. The statement has been made from many sources that patients, who for months had not been able to swallow any solid food on account of disease of the fauces or tonsils, could swallow immediately after an injection. This remarkable rapidity of action is not to be explained by anatomic changes, but depends on the removal of the pain, which was due to the action of the products of the secretion of the spirochætæ; "606" acts in this case as an analgesic. On the other hand, it has been occasionally observed that increased sensitiveness occurs in some patients similar to that observed after mercurial injections. The first observations in this respect came from Italy, where extraordinary caution was used and doses of 0.025 to 0.05 gm. ($\frac{1}{2}$ to 1 grain) were employed. The spirochætæ recovered themselves after a short time; they were not destroyed but were stimulated by the weak remedy so that the result was a great secretion of toxin.

Ehrlich has always regarded the drug as an arsenical and a dangerous remedy and has, therefore, insisted on the necessity of its thorough preliminary test. No one can expect absolute harmlessness in a remedy which is used to kill parasites. The mortality, following the use of the remedy, depends exclusively on the constitution of the patient, a law which holds for all dangerous remedies, even for chloroform. Ehrlich reported the use of "606" in 10,000 cases. The results demonstrated that "606" is not especially dangerous. In this large number of cases there was only one in which death immediately followed the administration of the remedy, and this was the case of a female patient whose disease, tertiary syphilis, must have eventually resulted fatally. In this case the injection was made with the acid solution and there was a certain shock which can be avoided with the

newer preparation. All other fatalities, of which the number might reach a dozen, occurred in cases of severe nervous disease,—tabes and the like,—in which the prognosis was very doubtful. If in such desperate cases unfavorable results ensue, it must not be concluded that the remedy is dangerous. Such extremely dangerous experiments must only be undertaken, if the physician has the conviction that he can save the patients, even though the patient could not be expected to become a useful member of society. A second contra-indication is furnished in diseases of the heart and blood-vessels in which the greatest caution must be observed. As to the technique, the alkaline solution which was first introduced by Alt and Iversen, has the slight disadvantage of being somewhat painful, while the neutral injection has the advantage of less pain. For that reason, the neutral emulsion should be preferred in neurasthenic and alcoholic persons and in patients sensitive to pain. Probably a combination of both methods, intravenous and subcutaneous injections, may be adopted. The dose depends upon the nature of the disease. A general dosage cannot be given. In nervous affections 0.4 gm. (6 grains) should not be exceeded, for these hypersensitive individuals react very unpleasantly in respect to the heart and central nervous system. Moreover, in these central nervous affections the number of spirochætæ is very small and a smaller amount of the remedy is probably sufficient for their destruction. It has been established that from 16 to 20 per cent. of the paralytics have lost their Wassermann reaction. These patients have not regained the reaction in a period of two years and this fact gives a most hopeful outlook for the future. In general, Ehrlich agrees with Neisser that the dose should be sufficiently large to effect a cure in one injection. In a relatively healthy person a dose as high as 0.8 to 1.0 gm. (12 to 15 grains) or even higher can be given without danger. Finally Ehrlich observes that the remedy is active in other diseases. Among these the most prominent are frambesia, which is very closely related to syphilis, chicken cholera, and certain forms of malaria. The fact has been independently established from various sources that a single subcutaneous dose was sufficient to relieve the fever in malaria. And in two smallpox cases, the remedy had an apparently favorable effect.

Neisser stated that the destructive action of the drug on the spirochætæ not only shortens the treatment of syphilis, but aids in restricting the spread of syphilis by promptly reducing the danger of contagion from the infected; although, he added, reinfections may probably be observed more frequently. He advises the combination of the tried method of treating the infection, although presumably it will not be necessary to keep up the old technique of seven or eight courses in the three or five years after infection. The serological test may reveal those who do not need continued treatment, but this is not always reliable, as experience has shown that after numerous negative responses the reaction may become positive and the symptoms may recur. Expectant waiting in these cases would lose the ground already won. The question now is whether the continued treatment, if deemed necessary, should be intermittent or continuous. The system may become accustomed to the drug and the spirochætæ may become drug-proof, while, on the other hand, with continuous treatment the special properties of the drug may display their best action. Early and energetic treatment with "606" in every case of syphilis he regards as a duty and does not rely on a single injection, but repeats the 0.6 gm. dose after three or six weeks, sometimes interposing mercurial treatment.

According to Alt, 75 per cent. of the mishaps reported to date might have been avoided by more scrupulous heed of the directions as to doses, solution, and administration. He stated that the drug not only kills all the accessible, fully-developed spirochætæ, but it induces hyperemia, local leucocytosis and mild inflammatory reaction in the syphilitic tissues and accumulations. When this process occurs in an enclosed space, as in the skull, the changes may entail transient symptoms of irritation or even paralysis. With syphilitic and parasymphilitic brain affections, slight sensory and motor symptoms may occur, but they generally prove transient. When paresis is so well developed that the untrained eye can recognize it, the affection has progressed beyond relief from any drug, benefit can be anticipated only during the stage of lightning pains. Especially in incipient taboparalysis the prospects are good for the treatment with "606." Cerebral syphilis, is a very convincing and grateful field for the new drug, but large doses should be avoided and the patient should be treated with as much caution as an epileptic with impending status epilepticus. The early forms of tabes have been much benefited in his experience; some of his tabetic patients treated last February and March have been freed to date (September) from their former attacks of pains. The effect of mere suggestion would probably have worn off long before this. One of his patients with pronounced ataxia last March, took part in the recent parade of veterans. He warns that tabetics are often in the habit of taking sedatives of various kinds with which one must reckon or untoward complications may result which might erroneously be attributed to the "606."

Wechselmann denounced the statement recently made that the "606" is equivalent to two doses of calomel, and reported a case in which the former apparently completely cured malignant syphilis which had resisted for four years numerous calomel and other mercurial and arsenical courses. The ulcerations on the penis had healed over only once and for a few days during the entire four years. After three injections of the "606" in the course of four months (0.25 m. 0.45 and 0.45 gm.) every process has healed and the patient's earning capacity has been entirely restored. He excludes from the treatment persons with flabby, weak myocardium, such as is often encountered in tabetics. Fever and an eruption are liable to follow the injection of the new drug when the heart is weak from any cause, although this reaction always subsided harmlessly in two or three days in his cases. No injury of the optic nerve from the new drug has been observed to date. Local necrosis has developed more frequently and proved extremely indolent. Some of the tissues are still capable of recuperating, so that active measures are contra-indicated in treatment. Ehrlich called attention to the local necrosis observed after injection of the remedy in the breast of fowls; certain tissues seem more susceptible. In conclusion, Wechselmann declared that the efficacy of the new drug has been proved by the experiences to date, while its dangers have proved less than had been anticipated at first.

Miekley observed transient arsenic melanosis in an infant with inherited syphilis, but otherwise had no ill results of consequence to relate from his 157 cases. Marguelies reported extensive research with the new drug, which has confirmed the fact that the principle of complete sterilization by a single large dose can be successfully applied in all the trypanosome affections studied. Further, the spirilla do not become accustomed to the drug, so that equally effectual action may be anticipated with fractional dosage in spirilla affections. The animals did not

show any increased sensitiveness to the drug under repeated doses. Gruenfeld obtained the best results from the "606" in tertiary and inherited syphilis and found it harmless. (He added that armed with this new remedy flying squadrons might be organized and sent throughout the country to combat syphilis as effectually as the flying squadrons now handle eye-diseases in Russia. Hitherto the tediousness of the treatment of syphilis has prevented the organization of flying syphilis squadrons.) Grouven reported infiltration and painfulness at the site of the first injection after a second injection elsewhere, demonstrating irregular absorption of the drug, but otherwise had no special by-effects even with four repetitions of the injections,—no signs of anaphylaxis or diminution of efficiency. He also reported the curative action on an infected rabbit obtained with the blood serum from a patient treated with "606." Glueck stated that he had observed no bad results in 417 cases, although he had injected doses up to 0.8 gm. in some cases. Friedlaender advocated an injection of the new drug in every case of chancre without waiting for a certain diagnosis. He advises the continuation of treatment with "606" only when new symptoms develop. Nagelschmidt reported extensive experiences with "606" in cases of incipient tabes and advocated his technique which has given excellent results. He gives first a very small dose; this is often followed by exacerbation of symptoms. He waits for this reaction to subside entirely, sometimes for one or several weeks, before he repeats the same or a little larger dose. Continuing in this cautious way with suitable intervals he has given up to 1.5 or 2 gm. of "606." Pick commented on the varying intensity of the reaction in different persons; the hysteric, neurasthenic and those with lively reflex action displaying the severest reactions.

Iversen recounts the successes he obtained with "606" in the treatment of relapsing fever. An injection of 0.3 gm. freed the blood from the spirilla in five to ten hours; hourly examinations after the treatment showed the progressive disappearance of the organisms. With the destruction of the latter, the fever would quickly fall and all the symptoms would be greatly ameliorated. This successful treatment of the spirillosis induced Iversen to try "606" in other protozoal infections, particularly in malaria; and he and his co-worker, Tuschnisky, experimented with the latter disease at Sotschi and Batum near the Black Sea. They treated 60 cases; 27 tertian, 4 quartan, 27 æstivo-autumnal and 2 tertio-autumnal infections. The drug was given in doses of 0.45 to 0.8 gm. intravenously and subcutaneously before, during, and after the paroxysms. In the tertian type the best results were obtained; 70 per cent. of the cases were cured by an intravenous injection of 0.5 gm., the plasmodia disappearing completely in twelve to twenty-four hours. No further paroxysms took place, the splenic tumor rapidly decreased and the general condition soon returned to normal. In the chronic cases with extremely large spleens the time for observation was too short to judge of the effect produced on that organ. In the remaining 30 per cent. of tertian cases, the clinical symptoms were quickly relieved, but the plasmodia could be found in the blood for some time after the injection. Quartan injections were less favorably affected; in two cases the paroxysms were rendered less intense and the plasmodia were not eliminated; in the other 2 cases, the drug had no appreciable effect either clinically or hematologically. The results in the æstivo-autumnal form, too, denoted no specific action on the part of "606." For, although the clinical course was improved, the headache relieved and the appetite improved, the fever curve remained

unchanged and the parasite could be found in the blood. In 4 cases the drug (0.5 gm.) induced an exacerbation of the disease, similar to Herxheimer's phenomenon in syphilis; the fever became higher and more irregular, the chills more severe and the blood-picture was remarkably changed in that, in addition to the pre-existing crescents, there suddenly developed a large number of ring forms. In two other cases which exhibited only the ring forms, these disappeared with a sudden fall of temperature, but in five days, the fever returned and the blood showed the presence of the crescent type of the organism. From these investigations Iversen concludes that while "606" does not specifically affect all forms of malaria, it does exert a marked action on the tertian and, to a less extent, on the quartan and æstivo-autumnal varieties. He suggests that a combination of "606" with quinine or methylene-blue might be effective in all parasitic infection. It is this product that Iversen's associates in Batum are attempting to perfect at the present time.

Schanz discusses the use of "606" in specific ocular affections and compares the action of the new arsenical with that of atoxyl. These observations on the latter drug were made in his own clinic and in the practice of Werther and Galewski. More than 100 cases of blindness resulting from the use of atoxyl were collected. From his personal experience, and from the investigations of Birsch-Hirschfeld and Koster, who studied 46 cases of blindness due to atoxyl, he learns that this drug has a very characteristic effect on the optic nerve. Unlike other atrophies, changes in the fundus are found only months after the onset of visual disturbances. In atoxyl poisoning, the field of vision was narrowed on the nasal side, whereas central vision remained quite acute. Color-blindness, usually one of the earliest symptoms of atrophy of the disc, was delayed for a long time. In other toxic conditions, the pupil soon failed to respond to light, whereas this was not observed with atoxyl. The pupillo-muscular bundle usually first affected in other toxic amblyopias, was only gradually changed by the arsenical. Since atoxyl does not influence the optic nerve in the manner of toxemias, it seems plausible to conclude that it would not be concerned in activating a pre-existing lesion of that nerve. Although "606" should have an action similar to that of atoxyl, it does not affect the optic nerve in the same manner as the syphilitic toxin, and consequently it could not be conceived as exerting a supplementary action to the syphilitic process. In atoxyl poisoning, the symptoms of amblyopia followed within several weeks to seven months. This leads Schanz to conclude that if "606" possessed a similar toxicity, the announcement would have been made long before this. He has not observed any instances among his own cases, nor found any in the literature, that showed ocular changes following the use of "606." It is his belief that "606" has no harmful effect on the optic atrophy of syphilis, but will arrest the process when used in the early stages of tabes.

Grosz, Chief of First Ophthalmological Clinic in Budapest, has successfully treated 14 cases of ocular affections due to syphilis: An ulcer of the cornea, 3 cases of iritis, 1 of iridokeratitis, 1 of scleritis, 2 choro-retinitis and 6 of keratitis. Accordingly, he draws the conclusion that syphilitic eye-affections should not be included among the contra-indications of "606."

Lesser states that this preparation exerts the same action as other arsenicals in syphilis as well as in other spirilloses, only in a much simpler manner. The general condition improves, the patients regain their appetite, and their pallor yields to the tint of comparative health. This

organotropic effect is also the main factor in its efficacy in syphilis, as it reinforces the natural defensive processes. He believes the direct destructive action of the new remedy on the spirochætæ in the body is not the principal factor in the cure of syphilis. The dosage should be selected with the aim of influencing the natural defensive processes and increasing the vitality of the cells without reference to any direct destructive action on the spirochætæ. It has been his impression from his observation that the symptoms and the transformation of the Wassermann reaction are not influenced more by the large than by moderate doses. If the reaction is still positive six or eight weeks after the first injection, it might be advisable to repeat the dose. A negative reaction seems to indicate at least a temporary inactivity on the part of the spirochætæ.

Riehl recommends the more recent method of Ehrlich's technique, a combination of the intravenous (0.3 to 0.5 gm.) and the intramuscular methods as the best for giving this preparation. He intends adopting the method of first producing a tolerance to arsenic by giving increasing doses by the mouth, as was advocated by him in the treatment of psoriasis and lichen ruber, in order to bring about a less likelihood of arsenic intoxications from this drug in syphilis. Kern reported upon 123 cases which were treated in Riehl's clinic, 78 of which received neutral emulsion (Michaelis), and 45 a slightly alkaline emulsion (Blaschko) with favorable results, but said that the time was too short upon which to base reliable opinion with regard to its ultimate cure. Of this number, there were two recurrences in patients having severe ulcerative syphilides. In the majority of the cases the Wassermann reaction became negative after four to five weeks.

Gennerich experimented extensively in order to perfect the technique of giving "606," considering very exhaustively and scientifically, the dosage, reaction, and other details of the methods of application. His conclusion from his rather extensive investigations is as follows: "The subcutaneous method of a weak alkaline emulsion, according to Blaschko and Wechselmann, when the preparation is produced absolutely sterile, should not produce any local infiltration. The dose must be varied according to the lesions and stage of the disease." The lasting effect of an intramuscular injection is not necessary as evidenced by the results obtained from an intravenous injection upon the other malignant processes. If this is indicated, it should be obtained by a subcutaneous injection given three or four weeks after the initial one. A dose of 0.5 to 0.8 gm. is sufficient in one in the second stage of the disease, in which mercurial treatment has not been successful. A second subcutaneous injection is necessary in cases in which the Wassermann reaction has not become negative after forty days. In all the severe cases, especially malignant syphilis, a double injection according to Alt is indicated, *i. e.*, 0.5 gm. intravenously followed in two days by 0.6 gm. subcutaneously.

Polland and Knauer report the outcome upon 50 cases treated with "606," in the Dermatological Clinic in Vienna. Their conclusions are as follows: Initial scleroses are cleaned in twenty-four hours; begin to cover with epithelium in forty-eight hours; and are free from infiltration in six days. The scar and pigmentation are present in some cases as long as eight to fourteen days. Specific lymph-adenitis does not disappear within three weeks. Macular eruptions depending upon their intensity disappear from twelve hours to four days. Papular eruptions require one to two days longer; discharging flat papules, present for three to four

months, are dried in three days. Elevations disappear in ten days, leaving pigment. Hypertrophic and drying papules, after being present from nine to eighteen months, disappear in three weeks. Mucous patches are usually rapidly healed in from twelve to twenty-four hours. Specific iritis was cured in from four to eight days. Ulcerative pustular syphilides in early stages are free from discharge in two to three days and completely healed in ten days. The healing of gumma depends upon the location and size. Small flat gummata of the skin have been observed to heal in eight days. Others have required three to four weeks. Gummata of the palate and pharynx healed from fourteen to twenty-one days. Large papules of the septum in the palate were scarred over and covered with epithelium in three to four weeks. They have treated cases in which eye and heart complications existed without noticeable ill effect upon these organic lesions. They did observe rapidity of pulse, palpitation and irregularity in cases having atheroma of the aorta, and caution against the use of this drug in this condition even though it be of specific etiology. They conclude from their observation that this preparation undoubtedly has an intensity of action upon primary and secondary lesions, especially upon malignant syphilis which resisted the effects of mercury, that is far superior to any other therapy. It should be used with great caution in diseases of the heart and the aorta. They saw that its effect on parasymphilitic lesions of the nervous system is very uncertain and will require further investigation.

Rosenthal concludes from his own experience and from the study of the literature on this subject, that this new remedy is undoubtedly superior to any other single or combination treatment for syphilis. He emphasizes the fact, however, that a freedom from specific symptoms does not indicate the cure of syphilis, and that these cases should be observed particularly for the effect of this drug upon the serum reaction. He places for its positive indications primary lesion, ulcerative process, particularly of the mucous membrane, and malignant syphilis, the frequent recurrences of which do not react to mercury. He says it is yet entirely too early to say whether it is an absolute cure in a majority of the cases, and advises the profession not to forget entirely the already well-established treatment of this disease, which has been so successful in certain forms of its manifestations.

Emery, former head clinical physician of Dermatology and Syphilis, Saint Louis Hospital (Paris), who gave the injection to cases reported by Gaucher, made an exhaustive study of "606" in Germany, gathering his observations principally from the clinics of Herxheimer, Lesser, Wechselmann, Michaelis, Tomaszewski, Blaschko, Sachs and Neisser. His paper is very comprehensive in its consideration of all the varied aspects of the new treatment. The various topics are considered in the following order: *Technique*.—Every patient who is to receive an injection must have been previously examined with the greatest care. The fundus oculi requires the most minute examination. The urine is analyzed and various other examinations made. The patient treated must be kept in bed during the first two or three days, and after that confined to his room from six to ten days. In preparing the solution the most exacting asepsis must be followed, as sterilization is impossible after the preparation of the drug. The chief methods are the following: *Herxheimer's Process*.—Average dose, 0.50 gm. The powder requires careful trituration in a mortar. A solution of $\frac{1}{3}$ c.cm. of 20 per cent. caustic soda is added, during the trituration. Then 10 c.cm. of water are added in small

quantities. The injection is made immediately so as to prevent separation and precipitation. *Blaschko's Process*.—20 per cent. solution of caustic soda of 1.225 density to which .09 gm. per dgm. of prepared powder is added, viz., 0.36 c.cm. for a dose of 0.5 gm. of powder "606." This is triturated for a long time and then 46 c.cm. of hot boiled water is added. *Michaelis's Process*.—For a dose of 0.5 gm. of the drug 1 to 2 c.cm. of ethylic alcohol is used as a solvent. Solution made in a test tube. 20 c.cm. of distilled *hot* water is added to this solution, gradually with continual stirring. When it is well dissolved, 1 c.cm. of normal caustic soda solution (40 per 1000) per dgm. of prepared powder is added. To the liquid from 2 to 3 drops of phenolphthalein (1 to 200) is added until it becomes red. Acetic acid is then added to this solution until it takes on the color of yellow sulphur. At this moment, 2 or 3 drops of the alkaline solution (Normal Na OH) are added in order to neutralize the excess of acid. Stop the operation when the upper part of the liquid shows a pink halo. The location chosen for the injection varies according to the choice of the operator. The injection of the substance is made at two periods of time, in one or two applications according to the quantity of liquid to be injected (5 to 25 c.cm.) and to the capacity of the syringe. The local and general reactions are seldom important. Pain seldom requires the use of morphia. The local swelling is rather similar to the reaction following the use of the insoluble mercurials. The rise of temperature is usually very slight, and occurs in 1 out of 4 cases. Constipation is more frequent than diarrhea. *Laboratory Control*.—The spirochætæ were frequently seen to disappear at the end of twenty-four to thirty-six hours; they seldom endured after six or seven days. Regarding the reaction of Wassermann, it was found to become negative in intervals varying from three weeks to two months. In comparison with this, the mercurial medication, even though it does produce negative sero-reactions, seldom accomplishes this until after a prolonged intermittent course of treatment maintained during three or four years. *Evolution of Lesions after Treatment*.—Primary Lesion: The action of "606" seemed to be particularly rapid in a case of sclerosis of the lip which healed in three or four days. Genital lesions were clearing up in two or three days and were healed at the end of five to ten days. The action on the original lesion proved to be less striking than the recovery in other lesions, and this is explained by the vascular thrombi in the chancre, which to some extent oppose themselves between the medicament and its contact with the spirochætæ. This same phenomenon may be noticed with mercurial medication, especially when soluble preparations are employed. One must not conclude from these partial and exceptional failures, or from the slow action of the "606" that its efficiency is to be doubted at this stage of the malady. Perhaps the best results may be obtained by combining the general treatment and "606" with the local treatment of the chancre by means of the galvano-cautery, or mercurial ointment. However, it is in these cases of combined treatment ("606" and Hg.) that Ehrlich absolutely forbids the use of any other arsenical such as atoxyl or hectine. Secondary Lesions: The simple mucous patches of the tonsils and of the soft palate, and the erosive syphilides are more resistant, especially when influenced by neighboring suppurations. In Lesser's practice cases of extreme vulvar syphilis were healed completely in eight to twelve days; without any other local treatment than simple cleansing baths. The lesions gradually begin to disappear, sometimes in twenty-four hours, at other times five to six days after the injection. This

extraordinary efficiency and rapidity of action on contagious lesions suggests the important part that this specific is destined to play in the prophylaxis of syphilis. The eruptive lesions also gave way very rapidly under the drastic influence of "606." The granular syphilides react more quickly than the papular forms, and still more so than the papulo-granular forms of lichenoids. The skin of patients suffering from secondary specific eruptions is affected in a peculiar manner as was first reported by Herxheimer. During the first few days following the injection, macular spots appear, or if a roseola is already present, the individual lesions will be more congested, take on a very pinkish color and are increased in volume, and will sometimes be surrounded by new eruptive macules. When papular syphilides of various kinds are present, the lesions will be encircled with a kind of areola or rosy halo which gives them an appearance of a sudden aggravation. This additional eruption disappears rapidly and with it there is a cure of the original lesion. Herxheimer does not consider these reactions frequent, or unfavorable signs for a cure. On the contrary, they are, according to his opinion, the forerunner of a rapid regression of the lesions. In regard to the malignant syphilides, Emery considers their treatment a veritable triumph; for it is in these affections that the curative action of "606" is most complete and rapid. In several instances there was marked and rapid improvement in deep and extensive, inveterate forms of palmar and plantar keratosis. Tertiary Lesions: In this stage the use of "606" is followed by the most brilliant results. The action of the drug is particularly startling, for all ulcero-gummatous formations. Among other instances, are mentioned an enormous gummatous ulcer on the leg, two large contiguous gummatous ulcers of the tongue, a gumma on the roof of the mouth, all of which showed great improvement. Moreover, there were recoveries in a very grave case of gummatous, ulcerative, pharyngeal and perilaryngeal syphilis, and a case of diffuse hypertrophic syphiloma of the nose and upper lip. The treatment of visceral syphilis at the present time is the least studied, but mention may be made of syphilitic icterus cured in less than a week, ulceration of the rectum, and a serious recurring syphilis of the stomach that were benefited by "606." In regard to ocular syphilis, the improvement in conjunctivitis, choroiditis, and iritis was indubitable, but the treatment was too recent definitely to appreciate the results. In spite of the contra-indications established by Ehrlich, a number of cases of syphilis of the central nervous system have undergone treatment and showed a certain degree of improvement. In particular there is one case of cerebral syphilis presenting a threatening aspect, the symptoms of which were soon reduced to a few attacks of headache. A woman afflicted long since with syphilis showed amongst other pre-ataxic lesions a commencement of papillary atrophy; after the injection of "606" she was considerably improved in respect to the acuity of vision. *Hereditary Syphilis*.—Several cases have been benefited by the use of "606" at a very early age, but on account of the dangers entailed, only the mother receives the injection and the child in a number of instances has shown marked improvement by taking the maternal milk. *Relapses*.—Emery has not been able to verify any case of relapse, but some observers have remarked on them. This may be explained by the fact that the spirochætæ are only parasites of the blood in a very transient manner and leaving it set up isolated lesions in different parts of the body. These are apt to become active again and to return to the virulent state after some considerable time. *Non-Success*.—Emery has not been informed of any in-

stance of failure, but witnessed one case where a man was attacked with ulcerative syphilis on the cranium and face, and the lesions showed no modification about ten days after administering the injection. It was thought that there was a kind of encystment of the substance as was evidenced by the persistency of the tumor at the site of injection. It is perhaps for this reason that the investigators have recently begun vigorously to massage the injected part for at least ten minutes after the injection. Ehrlich noted that in cases where a very tardy cure occurred it seemed to be due to the previous administration of arsenical preparations. Emery draws the following conclusions: 1. That at the present, this treatment is contra-indicated in elderly men; for all non-syphilitic visceral lesions—renal, cardiac, hepatic, splenic, pulmonary, and vascular affections, such as advanced aneurysm of the aorta; and in patients who have not a normal condition of the fundus oculi. In patients who suffer from a severe syphilitic affection of the brain, such as recent hemiplegia, acute or sub-acute meningo-encephalitis, it is necessary to observe the utmost caution, and, awaiting more ample information, to intervene only in very grave or desperate cases when mercury has ceased to be efficacious. Constitutional weakness and cachectic condition are not always contra-indications. 2. Indication for this treatment: (a) All lesions which do not yield to mercury; (b) for relapses immediately following an apparent cure with mercury; (c) repeated relapses; (d) total mercurial idiosyncrasy; (e) malignant syphilis, with secondary, or tertiary syphilides deeply destructive or mutilating; (f) initial lesions combined with radical local treatment. 3. That in every other case one may, according to the circumstances and fitness dependent upon the infection, use either Ehrlich's method or the old mercurial methods. He thinks, as do a number of writers on syphilis, these two methods of treatment assist and supplement each other in a certain number of cases. A long comparative study of the two kinds of treatment, of their advantages, their inconvenience, and their efficiency, will allow one to determine within their limits the precise indications for one or for the other.

Michaelis considers the reaction of the preparation and the most important factor in the technique of its administration. The question of the most efficient manner of dissolving the drug has not been entirely solved. In its free state it is insoluble and requires an acid or alkaline menstruum for its solution. It is least soluble in a very dilute alkaline or neutral mixture and this is the reaction of the blood and tissues in which the drug circulates after injection. This, he believes, explains its low degree of toxicity, as compared with other arsenicals, which are more readily dissolved in the fluids of the body. For this reason, it is never found in concentrated solution of the blood and attains no higher concentration than one to one thousand parts, irrespective of the alkaline or neutral character of the suspension. In contradiction to this, the actual facts prove that an alkaline solution acts with greater rapidity than the neutral suspension, and this investigator can offer no explanation for the tardy action of the neutral preparation. It is unlikely that an alkaline solution retains the same degree of alkalinity after as before the injection. After the solution is distributed by means of the lymph and blood-stream, it probably assumes the character of a neutral suspension. Michaelis follows the method of Wechselmann, but prefers the infra-axillary to the infra-scapular region as the site of injection and injects a neutral suspension directly into the muscles. The advantages are the absence of pain when the patient lies in the dorsal position and the more lasting effect from the slow absorption of the arsenic. Several immediate recoveries are reported, *e. g.*,

in a specific angina the pain disappeared in twelve hours and in a case of gumma of the lip of a month's duration, the swelling began to disappear in six hours.

According to Volk and Lipschuetz, the administration of "606" is greatly simplified and enhanced by suspending the drug in liquid paraffine or preferably in sterile olive oil, and then injecting the mixture beneath the skin of the back. In their 62 cases, they obtained favorable results with the exception of one case which was followed by a recurrence. They advise the use of large doses in recurrences, gummata, ulcerative syphilides, sclerosis and adenitis.

Citron attributes the unfavorable results following the use of "606" to the administration of acid preparations. He uses a syringe by means of which a definite proportion of calcium carbonate is added to the drug, thereby insuring a neutral solution. The advantages of this method are the following: The entire mixture is formed in the syringe and consequently may be kept sterile with the greatest ease; the use of the bland calcium carbonate does not occasion the irritative phenomena, so frequently observed after the use of the more caustic alkalies; moreover, accurate trituration is unnecessary with this method, since an excess of calcium carbonate is followed by no ill results. Citron obtained excellent results by applying this technique in animal experimentation. In 10 cases of syphilis in man, it produced no local or constitutional symptoms and did not modify the specific action of the drug.

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Among the unfavorable reports, those read before the French Academy of Medicine by Gaucher and Hallopeau offered the most adverse criticisms. That these unfavorable reports do not emanate entirely from French investigators is shown by the review of Fischer, Buschke, assistant in the Virchow Hospital, Berlin, as well as the reports of many other German authorities.

The report of Gaucher represents the results of three months of research conducted by this investigator and his associates. The problem was considered from the viewpoint of chemistry, pathology, physiology and clinical observations. Gaucher was assisted by Desmoulière in the chemical investigation, Paris in the pathology, and Lucien Camus and Jean Camus in the physiology of "606." The special organs were examined by various pathologists of repute. Emery administered the drug in the clinical cases. The results of the investigations were observed and confirmed by representatives of various countries who assisted Gaucher in his work. In order to comply with the laws of France, which prohibit the use of drugs of unknown composition, the cases for treatment were carefully selected; only those were accepted who repeatedly requested to be treated and were willing to relieve the investigator of all responsibility in the event any complications should follow the use of the medicament. The report includes the following topics. *Chemistry*.—The drug yields the characteristic reaction of phenolcompounds when treated with a solution of ferric chloride. It reduces oxyhemoglobin as is shown by the spectroscope. Albumin is precipitated by an acid or neutral and, to a less degree, by an alkaline solution of "606." This precipitation is assisted by the addition of sodium chloride. *Pathology*.—Eleven guinea-pigs were injected with "606" in doses ranging from .009 to .12 gm. per 100 gm. of body weight and succumbed in one to thirteen days. In those that died in twenty-four hours (dose .01 to .012 gm.) the organs were intensely congested and contained hemorrhagic foci. The liver was enlarged; the

blood-vessels engorged; the trabeculæ were compressed and the hepatic cells around the portal radicles were infiltrated with fat. The kidneys were congested, especially in the cortex; interstitial and intralobular hemorrhages and a small cortical infarct was observed. The spleen was greatly congested; the Malpighian corpuscles were hypertrophied and infiltrated; the large white cells were increased and filled with blood-pigment, and there was a small thrombus which was partially organized. The suprarenal glands showed medullary engorgement; the heart was cyanotic and filled with agonal clots; the myocardium was congested. The lungs presented basal congestion and subpleural lobular hemorrhages. The intestines were filled with diarrheal material. In the animals that died on the fourth day, similar changes were found. Those that lived nine to thirteen days were affected to a slighter degree, the liver and kidneys presenting less important lesions. The toxic dose for guinea-pigs is .08 gm. per kilogram of body weight. The phenomena observed at autopsy correspond to evidences of arsenic poisoning. *Physiology.*—A number of experiments were performed on dogs and the following observations were made: Therapeutic doses (.01-.02 gm. per kilogram) in alkaline solutions introduced into the veins or muscles only slightly affect the blood-pressure and pulse-rate. Increased doses caused a fall of blood-pressure and a profound modification of the cardiac rhythm, the pulse becoming depressed, rapid, and irregular. In addition there followed vomiting, hematuria, respiratory increase, asphyxiation, and death. The intravenous injection of a neutral solution induced fatal embolism in two instances. *The coronary arteries showed multiple emboli from an albuminous precipitate of "606."* The epithelial and endothelial structures were most affected in these animals. But the marked susceptibility of the nervous structures is clearly evidenced in animal experimentation. Two rabbits died after receiving a spinal injection of .0075 gm., their death being preceded by convulsions and coma. In three instances dogs succumbed to minimum doses (.0035 .0025 gm.) which were injected into the cerebrospinal fluid. As to the reaction, guinea-pigs were more affected by alkaline solutions, which is due to the fact that alkaline solutions are distributed more rapidly. Neutral solutions of the drug occasioned a lower rate of mortality. Some of the animals injected with acid solutions were living at the time of this writing. The latter solutions are partially precipitated and therefore, are less toxic. *Clinical Observations.*—Gaucher states that "606" does not surpass hectine in its curative properties; that it affects only certain manifestations and that recurrences and exacerbations of the syphilitic process are very frequent. Seven cases are considered in detail to substantiate the statement that "606" is not permanently curative. Lesions of the skin and mucous membrane are, under certain conditions, greatly improved, but this may be due to the cicatrizing and not to the specific action of the drug, since arsenic has long been recognized as a keratoplastic agent. Mucous lesions were sometimes healed in two to four days; others, however, resisted the drug for a longer period and in some instances, were entirely unaffected. Ulcerous patches, in particular, are benefited only slowly or resist "606" entirely. Papular patches are very resistant. Chancres often disappear in two or three days, but ten days or even a longer period were required for complete cicatrization. Gummata disappear no more rapidly than with mercurial treatment. Tertiary lesions of the mouth are known to have disappeared in ten days when mercury was used. An oral gumma endured twenty days after the use of "606." The latter remedy is valuable, however, in gummatus formations which have resisted mercury. In several instances, cutaneous

gummata were not improved by the use of "606," and a number of ulcerous syphilides of the mouth were intractable or improved only after a period of four weeks. It was found that dry cutaneous lesions were less frequently improved than ulcerative conditions. Roseola readily disappear but papular lesions are more resistant. Lesions on hairy parts and tuberculous syphilides were removed with difficulty. Papular tuberculous syphilis showed no improvement a month after the injection of "606." Frequently, mild secondary lesions reacted well to the latter drug, but not with greater readiness than to benzoate of mercury. Remarkable results were observed in certain tertiary conditions, but on several occasions, there was a loss in weight, which detracted from the state of recovery. In regard to failures, no improvement was observed in syphilitic leukoplakia buccalis, tabes, and general paresis. Syphilis of the osseous system was not treated by Gaucher. Neither did he apply the remedy in nephritis, but he saw one case benefited and another rendered worse by the use of "606." From these investigations Gaucher concludes that Ehrlich's remedy is not curative; it does not prevent recurrences, regardless of the fact that it causes them to disappear. It affects cutaneous and mucous lesions, especially of the superficial and, to a less extent, of the ulcerative type. Its action is rapid, but not permanent. In some cases "606" is beneficial when mercury has failed, but on numerous occasions, it has not been proven to possess that superiority. In visceral syphilis, it shows no efficiency and may actually be detrimental.

Hallopeau reports extensively on the value of hectine as an abortive of syphilis in comparing its action with "606," other arsenical preparations, and the ordinary syphilitic treatment. He reports in detail many other favorable results obtained by this remedy (hectine) and believes that it will abort syphilis if properly given in the incipiency of the disease. He also reports cases of "606" having recurrences which were apparently cured by hectine. He gives detailed accounts of cases of his own, some of his colleagues which were only slightly benefited by "606." According to him "606" does not fulfill the conditions of harmlessness and of constancy of effect which alone would justify the interest taken in it. There have been, he says, fourteen deaths from its use, two in Paris, besides cases of blindness. These criticisms, he says, should be circulated by the lay press. Objections to Hallopeau's attitude ensued in the Academy. Dr. Netter, *agrégé* professor at the Paris Medical College, in discussing this paper, expressed surprise at hearing Hallopeau's unfavorable comment. The case of death mentioned, he said, could not be considered as due to the drug; and as for the cases of blindness, Netter had heard of none. He believed that great credit is due a man of such high standing and great scientific probity as Professor Ehrlich.

Fischer states that Buschke, whom he is assisting, declares that his extensive experience with the new remedy in the dermatological department of the Rudolf Virchow Hospital at Berlin has convinced him that it should be reserved exclusively for patients resistant to mercury. He has also encountered a few patients refractory to "606," and prolonged observation is showing that even when the primary manifestations have subsided under its influence, general symptoms are liable to develop later. The lesions which disappear so rapidly under the "606," are the kinds which promptly subside under any other method of treatment, the indurated chancres being more slowly influenced. In one case the chancre was found only slightly diminished and swarming with spirochætæ two months after the injection of the usual dose of "606," while the patient

has been tormented with extremely frequent and severe colic pains never observed before, and which Buschke ascribes to the arsenic. He says that no one seems to appreciate how rapidly syphilides may subside under ordinary treatment. Clinicians are surprised by the rapidity of the action of the "606," but, if they will keep records of the cases in which mercury alone was used, they will frequently find that the syphilides disappear as rapidly or even more rapidly under mercury. In a recent case a much debilitated man had numerous syphilitic ulcerations over his body, especially on the legs, with papulous syphilides on the back. Under salves and baths the ulcerations all healed over in twelve days and then mercury was commenced, under the influence of which the papulous syphilides soon healed. The man gained six pounds in three weeks. The tonic effects of the care and food in the hospitals have often an amazingly favorable action on the general health without any drugs or mercurial treatment. But "606" has displayed great efficacy in the severe and extensive syphilis refractory to mercury. This seems to be the special field of the new drug, although it may fail even here, as in a case Fischer has previously reported. Syphilis of the central nervous system also seems, in certain cases, to be amenable to the new drug, but special caution is required as cases have been reported in which no benefit but actual harm has followed its use; even fatalities have been reported. On the other hand calomel renders good service in these cases, especially in the recent cases. Recurrences after "606" have been frequently reported, but the question is whether the recurrences are exceptionally mild or not. In four cases in Fischer's experience the recurrences were unusually early and intense; in one case, the symptoms suggested arsenic intoxication but they might have been explained by some incipient syphilitic cerebrospinal trouble; but other symptoms suggested hysteria and an epileptiform seizure, and weakness of the right leg further complicated matters in respect to the share of the "606" in the syndrome. No ethylic alcohol had been used in injecting the "606." Rille and Spiethoff, too, have reported epileptiform seizures after its injection. In five other cases in which "606" had been injected on account of skin lesions, recurrences were observed taking the form of serous iritis in four and of neurochorioretinitis in the other. He can mention a number of similar cases observed by others, the recurring manifestations developing in the eyes. There was no ocular predisposition in any of these five cases, ophthalmological examination before the injection of "606" having shown normal conditions. He thinks that the new remedy probably has a special affinity for nerve tissue, and although it does not directly injure the nerve, like atoxyl and arsacetine, yet it provides a place of lessened resistance and here the syphilitic virus preferably locates a syphilis *ex trauma*.

Orth reported experiences with local necrosis in the buttocks after injection of "606." In the first case death followed the 10th day after the injection, but the tissues were bacteriologically sterile and there was no suppuration. In the second case the patient died from cancer in the throat 6 weeks after the injection; the necrotic patch still showed the yellow field around a hemorrhagic centre characteristic of this necrosis.

Rille and Pinkus have recently reported three cases of jaundice following administration of "606." The local necrosis sometimes observed is evidently of purely chemical nature; it is exceptionally torpid, and operative removal of the necrotic tissue if practically impossible as the necrosis goes very deep, the chemical action extending far into the interstices in the tissues. The breast is a particularly unfavorable point

for the injection on this account; in one patient the necrosis in the breast extends down and into the ribs and there is danger of perforation of the pleura. Only a part of the arsenic seems to be taken up into the tissues; the rest is slowly, possibly intermittently eliminated, and these factors vary in different individuals, so that it is unusually difficult to determine the tolerated dose. Fully as good therapeutic results have been observed with small as with large doses. Alt and Hoffman have reported severe cardiac symptoms after the injection of the new drug, and Fischer reports another grave case of this kind.

Bardachzi and Klausner found an increased proportion of urobilin in the urine after injection "606" in a number of patients, but the most striking effect was a remarkable transient increase or decrease in the red blood-corpuscles which was regularly observed in the patients whose blood was examined. The number of reds showed fluctuations of 1,000,000 or more in the seven cases cited, running from 5,750,000 to 4,300,000 in one case in twenty-four hours and dropping from 4,800,000 to 3,800,000 in another case.

Weintraud concludes from his experience in 125 cases that syphilis is not definitely cured by a single injection of "606" and that no benefit can be expected from it in tabes. The syphilitic infection may injure a predisposed nervous system to such an extent that even the most thorough treatment may not prevent the development of locomotor ataxia. In a few of his patients, the new remedy failed to display any therapeutic action, and the Wassermann reaction persisted unmodified in many of the patients; in others, after a negative phase, it became positive again in a few weeks. The negative phase after a treatment with "606," therefore, does not indicate a complete cure any more than after mercurial treatment. Recurrence was observed in 14 out of 80 cases of recent and secondary syphilis. In only 37 out of 77 patients, did the Wassermann reaction remain negative. In three cases the Wassermann reaction persisted unmodified, even after a second and third injection of "606." He thinks it improbable that permanent results will follow increased dosage. In his experience intravenous infusion of the drug which brings the whole organism under its influence more thoroughly, was not followed by permanency of cure any more than with the other techniques. It seems that the body reacts as promptly and extensively to a small as to large amount of the drug, and this reaction is the chief aim in the treatment of human beings, while in an animal the purpose is to kill all the organisms at one injection. Repetition of the doses may prove as effectual as with mercury. None of the symptoms in his twenty cases of tabes seemed to be influenced by "606," but it displayed great efficacy in patient refractory or intolerant to mercury and iodine. There is grave danger that physicians and the public will regard the problem of the cure of syphilis as too simple and as already solved. It must be reiterated that the cure in man is a far more complicated process than the cure of experimental syphilis.

Uhlenhuth discusses the results of arsenicals obtained in the treatment of the spirilloes. He contrasts the reaction of atoxyl and atoxyl-saurin, a combination of atoxyl and mercury, with the results obtained from the use of "606." He concludes that the latter remedy while affecting syphilis more rapidly than do other arsenicals, is incapable of sterilizing the entire organism and effecting a complete cure in such chronic diseases as lues and sleeping-sickness. This is possible in other spirilloes, however, in which the organism itself aids in producing immunity by the production of antibodies.

Ehlers injected the drug according to the technique of Wechselmann. The patient was a man of forty with paralytic dementia which had improved considerably under psychiatric treatment, so that he was able to walk, read and understand part of what he read. He had had two apoplectiform attacks previously, one two years and one five weeks before the injection. The injection was not followed by any local reaction but progressive symptoms on the part of the nervous system developed. The patient died on the fiftieth day of progressive cardiac weakness. No cause for the fatality could be discovered at autopsy, except the parenchymatous degeneration of the organs.

Pick states that since his first publication, recurrence of symptoms has been observed in some of the cases previously reported. He encountered 6 refractory patients among the 200 that were treated.

Eitner reports a case in which an injection of "606" was followed by retention of urine and constipation, with abolition of the reflexes, the clinical picture being identical with that of the two cases reported from Prague. He never uses ethylic alcohol, so that the disturbances cannot be explained in this way, which was the explanation accepted for the Prague cases. He used for the injection a mixture of what was left in two tubes of "606," the greater part of the contents of the vials having been used in another case respectively fourteen and three days previously. The tips of the tubes were fused to protect the remaining contents, and he thinks that the heat applied in the fusing must have modified the drug in some way to render it more toxic. Experiments on animals with the "606," after it had been heated, seemed to confirm this assumption of a toxic modification of the drug under the influence of heat.

In regard to the sequellæ of the use of "606," Klingmueller and Pinkus report a case of gangrene, three cases of local necrosis, two of abscesses, three of toxic erythema, one of detrusor paralysis, one of tenesmus, and a case in which pre-existing diabetes became aggravated and still persists to date.

According to Frenkel-Heiden the reports of the nervous affections, supposedly cured by the use of "606," are not deserving of grave consideration. He believes it more important, in judging the character of improvement in these diseases, to observe the quality of the pupillary reaction than the subjective symptoms, such as the tabetic pains, etc., which often disappear without the application of any drugs. He concedes that active lesions of the nervous system readily respond to the curative action of "606," but states that in parasyphilitic diseases, the drug must be administered in exceedingly large doses. The question arises, therefore, whether it is justifiable to subject a patient to the dangers of such quantities of the drug, or whether the same results may be obtained by exhibiting the remedy in repeated doses in smaller amounts. Frenkel-Heiden offers reports of cases treated by other investigators, many of which prove the curative properties of the new remedy. The objection raised against the use of "606" is that the nervous tissue in tabes and paralysis is incapable of restitution. Nevertheless, the drug should be used in these diseases since the actual degree of degeneration is not known, and there always remains the possibility of arresting its progress. The relief of the pains in tabes and the improvement of the paretic ocular muscles should not always be ascribed to a regeneration of nerve-tissue, but possibly follow the removal of gummatous pressure on the meninges. The progress of tabes, in his opinion, is due more to the progressive arteriosclerosis and to intercurrent infections than to direct degeneration of the nervous tissue.

In the reports of nervous diseases he draws attention to the lack of analysis of the cerebro-spinal fluid and believes that such examinations would more definitely decide the action of "606" upon lesions of the cord. His conclusions are that Ehrlich's remedy is not contra-indicated in paralysis and tabes; that its use is not attended with danger; that it exerts a favorable action upon tertiary lesions of the central nervous system, but has very little effect, either favorable or unfavorable, upon parasyphilitic affections.

Willige reports upon the observation of 24 cases of tabio-paralysis in 35 cases of nervous syphilis and concludes as follows: The action of Ehrlich's preparation upon metasymphilitic diseases of the nervous system is uncertain. Some results indicate the possibility of improvement by this treatment, and a prevention of remissions of the disease. The method of giving increased doses, repeated smaller doses, or combining this drug with other treatment has not been established up to the present time. The best results were obtained from the repeated small doses. Ameliorating influence upon the Wassermann reaction was not observed. It produced no untoward effect upon the lesions of the individual in any of their cases. Optic atrophy was not considered as a proper indication for its use, nor did it have any bad effects upon severe forms of diabetes, which were present in a number of their cases.

Treupel reports on the extensive observation of the action of this drug upon specific diseases of the nervous system, in particular, tabes and paralysis. Some of these cases have been previously reported, and he gives the course of the disease since his last communication. In 6 cases of lues of the central nervous system, 4 reacted very favorably in a comparatively short time, and have had no recurrences of symptoms indicating lesions since their recovery. In 21 cases of tabes and tabio-paralysis, he gives the following favorable report: For two to three days, the lancinating pains would frequently be increased. After this they would gradually ameliorate and the general condition would improve, as was evidenced by gain in weight and strength. The parasthesias and sphincter functions of the bladder would improve and the taxia would decrease. This improvement would exist for months, but would not be permanent. No material effect upon the pupils or reflex was observed in clinical cases. Optic atrophy was not increased in any of the cases. The Wassermann reaction became negative in a very small per cent. of cases. In 10 cases of progressive paralysis, some of which were in their incipency, there was apparent arrest of the disease with the exception that they had to be confined. There was no chance of improvement in the objective symptoms of this disease during the nine months of observation. He concludes from his observation that, in diseases having already a degenerative process of the nervous system, this therapy will have little influence with regard to relief. Whether it will be able to stop the progress of incipient cases, can only be determined by more extensive investigations.

Wechselmann's most recent report deals with the susceptibility of certain individuals to arsenobenzol. From his large number of cases (over 900), he was impressed by the many different degrees of local and general reactions which followed the injection of this remedy in different individuals. The well-known local reaction already described following subcutaneous and intramuscular injections induced him to investigate this point with considerable detail. He was surprised to find that nervous women, who undertook the treatment with considerable apprehension, had a less painful local reaction than phlegmatic males. He found that the irritative reaction of the tissues, which usually occurs on the second or

third day, was due to more or less edema, which later changed into a connective-tissue mass followed, in some cases, by a hard infiltration or cyst, disappearing in from two to four weeks. This was not due to infection or reaction of the tissue to the caustic. It was present to a variable extent in different individuals. In some cases the infiltration was the size of a fist, appeared within a day and was followed in a short time by a brown necrotic slough. In other cases this change would take place at the end of the second week. The ulcer produced by this slough, held in its wall, arsenobenzol, and has been proven by him, as well as by Orth, as not being due to infection. Undoubtedly the susceptibility of the patient plays an important role in the technique of giving this drug. If the preparation is properly introduced subcutaneously or intramuscularly, these bad effects can be avoided. On the contrary, if a subcutaneous injection is given too deep into the fascia, secondary irritative effects of arsenic, with the following of necrosis, is liable to take place. In those lean individuals, where there is an absence of adipose tissue, it is difficult to give a subcutaneous injection, which might not produce serious local reaction. In giving subcutaneous injections it is, therefore, necessary to see that the needle moves freely in a considerable circle beneath the skin, in order that it is not in the lower layers of the skin or the underlying fascia. The location should be selected which contains the most fat free from glandular tissue. Insert two needles and inject one-half of the substance through each needle, while moving the point of the same under the skin, so as to distribute the drug over considerable surface. In giving the intramuscular injections of the back, he also uses this technique of giving a small amount through a needle placed in one direction, and then by changing the direction of the needle the substance is distributed over considerable tissue area. Among the general reactions, that he observed in individuals considered by him susceptible to arsenic, are the following: One case (general paresis) had fever and a hyperemic area at the point of injection on the first day. The second day there were fever, a general exanthema, and conjunctivitis. The pulse remained good and the general condition was otherwise unchanged. The urine was free from blood and albumin. This case cleared up rapidly. In his later observation, he observed these reactions in certain individuals. (1 per cent. of his cases.) The incubation was eight to ten days with the initial symptoms of hyperemic area around the point of injection. Small herpes which soon changed into pustules formed over this hyperemic area. Usually about this time there were a rise in temperature and a more or less generalized scarlatiniform exanthema accompanied by conjunctivitis. The exanthema occurs first about the extremities and spreads to the rest of the body. In some cases, gastric symptoms, diarrhea with considerable thirst, coated tongue, and sometimes vomiting occurred. The patient felt very sick, but the pulse was not much increased. The urine was free from albumin and sugar. The duration of the temperature was usually three or four days. In some cases there was a rise of temperature on the eighth or tenth day without the cutaneous mucous membrane lesions. He compares this reaction as similar to the anaphylaxis reaction of serums. He said that up to the present time, while he had had no serious unfavorable reactions, that his experience had forced him to caution against the use of this drug, particularly in cardiac complications. Furthermore, that it was necessary to continue to watch the effect of this drug very carefully in order to establish with more certainty the indications and the contra-indications for its usage.

THE CEREBROSPINAL FLUID IN SYPHILIS AND IN PARASYPHILITIC DISEASES.

A REVIEW OF RECENT LITERATURE.

By S. STROUSE, M. D., of the Editorial Staff.

1. Nonne and Apelt: Ueber fractionirte Eiweissausfallen in der Spinalfluessigkeit von Gesunden, Luetikern, functionell—und organisch Nervenkranken, und ueber ihre Verwerthung zur Differentialdiagnose der Dementia Paralytica, Tabes Dorsalis, tertiären und abgelaufenen Syphilis. (*Arch. f. Psych.*, 1907-08, xliii, 433.)
2. Nonne: Clinical Diagnosis of the Syphilogenous Diseases of the Central Nervous System. (*Jour. Amer. Med. Assoc.*, 1909, liii., 289.)
3. Noguchi and Moore: The Butyric-Acid Test for Syphilis in the Diagnosis of Metasyphilitic and Other Nervous Disorders. (*Jour. Exper. Med.*, 1909, xi., 604.)
4. Noguchi: The Serum Diagnosis of Syphilis. (J. B. Lippincott Co., Philadelphia, 1910.)
5. Jones: Modern Progress in Our Knowledge of the Pathology of General Paralysis. (*Lancet*, 1909, ii., 209.)
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8. Ross and Jones: On the Use of Certain New Chemical Tests in the Diagnosis of General Paralysis and Tabes. (*Brit. Med. Jour.*, 1909, i., liii.)
9. Meyer: Zur Untersuchung des Liquor Cerebro-spinalis. (*Neurol. Centralb.*, 1909, viii., 786, 2204.)
10. McCampbell and Rowland: Studies on the Clinical Diagnosis of General Paralysis of the Insane. (*Jour. Med. Research*, 1910, xxii., 169.)
11. Marinesco: Sur la Diagnostic de la Paralysie Générale et du Tabes par les nouvelles Methodes. (*C. R. Soc. Biol.*, 1909, lxxvi., 648.)
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14. Stillman: A Report Upon the Value of Noguchi's Reaction on Spinal Fluids. (*Proc. N. Y. Path. Soc.*, 1909, n. s., ix., 1-2.)
15. Amsden: Report of Certain Lumbar Punctures at Bloomingdale Hospital. (*N. Y. Med. Jour.*, 1910, xci., 438.)

16. Apelt: Beiträge zur Frage der Berechtigung der Spinalen und Cerebralen Punktion. (*Berl. Klin. Wochenschr.*, 1910, xlvii., 1540.)

A great part of the light of modern research on the pathology of syphilis has been turned on the question of the relation existing between syphilitic infection and general paralysis and tabes dorsalis. Many of the former assumptions have been proved to be scientific facts by the wide application of the Wassermann reaction and by detailed studies on the spinal fluid. Most of the latter investigations have been directed to chemical and cytological diagnostic aids, and the results have been in most cases absolutely conclusive. The normal cerebrospinal fluid contains such a small amount of protein as not to be detected by ordinary methods, whereas in the parasyphilitic affections there is an appreciable increase easily determined. As the protein that is increased is serum globulin, all tests proposed to measure this increase are those applicable to the determination of globulin; and those most commonly used may be briefly described. Nonne modified the original Nissl method by his now well-known Phase I., which consists in mixing equal parts of spinal fluid and a saturated solution of ammonium sulphate, and allowing the mixture to stand three minutes. At the end of this time a positive reaction is shown by the tube assuming an opalescence or definite cloudiness. The interpretation of the end reaction with this method is at times confusing, and to obviate this difficulty Ross and Jones modified it by making a ring test similar to Heller's nitric acid test for albumin in the urine. They float one part of the spinal fluid on two parts of a saturated solution of ammonium sulphate and examine the ring formed at the junction of the two fluids. Noguchi, while studying the chemistry of the serum reaction in syphilis, devised a very simple test for increased globulin, the use of which has given excellent results in the hands of most workers. To one part (0.01 c.cm.) of spinal fluid are added five parts of a ten per cent. solution of butyric acid in physiological salt, the tube brought to a boil, and immediately one part of normal sodium hydrate added. The tube is again boiled, and either immediately or within two hours a definite fine or granular precipitate is seen in positive cases. This is to be differentiated from a slight cloudiness which normal fluids may give. Although all three of these tests are supposed to indicate the same thing, there seems to be a general agreement that the two last described are more delicate and offer less difficulty of interpretation than Nonne's Phase I.

Considerable attention is being paid to the total cell count and the differential count of pathological spinal fluids. Normally there are a few cells, averaging from two to eight per c.cm., practically all of the small mononuclear type; but in many diseased conditions of the meninges a considerable increase appears. Most workers consider a total count above ten as indicative of a pathological condition, and in general paralysis and tabes one usually finds a variable increase, almost always of the small mononuclears. The technique of counting has not been altered to any extent, and is simply executed by means of the ordinary red blood-cell counting pipette, whereas the differential is made from a centrifugalized specimen in exactly the same manner as is done with blood.

Properly to appreciate the value of increased globulin and lymphocytosis one must realize that with the exception of the Wassermann there is nothing in the spinal fluid absolutely pathognomonic of syphilis, and the true estimate of their worth can be obtained only by careful correlation

with clinical findings. For instance, both increased globulin and lymphocytosis are present in inflammatory conditions of the meninges like tuberculous meningitis, but the clinical history of the latter condition is not likely to be confused with the history of general paralysis, tabes, or cerebral syphilis. It has been shown that in approximately ninety per cent. of all cases of tabes and paresis both the lymphocytosis and the globulin reaction are positive, whereas in other conditions of the central nervous system clinically resembling these both reactions are negative. They have been thoroughly tested in the neuroses and psychoses with negative results, less absolutely in such conditions as multiple sclerosis, idiopathic epilepsy, pseudo-tabes alcoholica (Nonne), tumor cerebri; and the studies so far undertaken are sufficient to warrant the statement that the presence of either the globulin or the lymphocytosis or both is presumptive evidence against the presence of a pure psychosis of non-syphilitic origin and in favor of general paralysis or tabes. As far as the relative delicacy of the tests are concerned, practically all authors are in agreement that since both represent the same pathological process they are of approximately equal value. In other words, when there is an increased cell count, there is likely to be an increased globulin fraction and vice versa, but at times either one may be present without the other. No explanation is offered for this apparent discrepancy and the opportunity still remains for further study on this point. Although the figures for the incidence of a positive Wassermann in the cerebro-spinal fluid in tabes and general paralysis vary from 50 to 95 per cent., there is no divergence from the opinion that lymphocytosis and increased globulin are present far more frequently than is the Wassermann; and although not as absolutely pathognomonic as the latter, they are extremely valuable, especially in connection with a positive Wassermann reaction in the blood.

In the diagnosis of cerebrospinal syphilis the tests are again of great value, but they are powerless in the differential diagnosis between direct syphilitic involvement of the central nervous system and the parasyphilitic affections. The Wassermann reaction is given by about 90 per cent. of all cases of cerebrospinal syphilis, and lymphocytosis and increased globulin in practically all. The absence of the reactions in brain tumor and in other conditions likely to be confused with the protean manifestations of syphilis of the nervous system renders the tests of extreme diagnostic value.

To summarize this abstract it can be said that in addition to the application of the Wassermann reaction attention is being paid to increased globulin and increased cell counts. The presence of these two conditions can be easily ascertained in cerebrospinal syphilis as well as in parasyphilis. In addition to being of great value in diagnosis they have also shed light on the underlying pathology of general paralysis and tabes dorsalis.

SERUM DIAGNOSIS OF SYPHILIS.

A REVIEW OF RECENT LITERATURE.

By CARL FISCH, M. D., of the Editorial Staff.

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4. Fruehwald and Weiler: The Modification of Wassermann's Method by Dungers. (*Berl. klin. Wochschr.*, No. 44, 1910.)
5. Muenz: The Wassermann Reaction Made During Office Hours. (*Deutsche med. Wochschr.*, No. 37, 1910.)
6. Pappenheim: As to the Question of the Origin of the Wassermann Reaction. (*Muench. med. Wochschr.*, No. 44, 1910. See in connection, E. Jacobstahl's article in the same number.)
7. Plaut: The Present Status of the Serological Demonstration of Syphilis of the Nervous System. (*Muench. med. Wochschr.*, No. 30, 1907.)
8. Wassermann and Meier: The Clinical Use of the Serum Diagnosis in Lues. (*Deutsche med. Wochschr.*, No. 32, 1907.)

The serum reaction, usually called the Wassermann reaction, will be discussed first in regard to the method itself, and then in regard to the many problems involved as to its worth and value in relation to syphilis. Wassermann utilized the previous method of Bordet in an attempt to apply it, not only in the case of living bacteria, but also to their substances and products. He found by this method that a specific reaction could be evolved which pertained only to the specific substance. After establishing this specificity for a great number of different pathogenic, bacterial and other well-known substances, the nature of which was known, he attempted, on account of its hitherto impossibility, to cultivate or isolate the *spirochæta pallida*,—the cultivation has lately been made in animals and even in artificial media,—so as to produce a specific reaction, by contact of the substances extracted from the syphilitic tissue with the products of the body present in the serum of syphilitic individuals (antigen and receptors). This was found possible. Though we do not know what the reacting substances are, because of our lack of knowledge as to how to deal directly with the *spirochæta*, it is a certainty, nevertheless, that they are only present in a syphilitic process.

Wassermann's method is very complicated; in the first place, to follow it requires absolute exactness, and materials, which, under ordinary circumstances, are not only difficult to obtain with facility, but must be kept

under constant control. Hence, this reaction will always be limited to laboratories and to those experimenters who have made a special study of it. According to Noguchi, Dungern and others, all attempts to simplify this method, so that it can be used to its full worth by the general practitioner, have entirely failed; therefore, the only conclusion to be drawn is that the original Wassermann method should be the only one used.

To show the complications which are associated with this method, I shall describe in detail its technique.

The patient's blood is obtained by puncture of one of the veins of the arm, and the quantity should at least be 10 c.c. The serum is poured into tubes which are sealed by means of heat, during the space of twenty minutes at the temperature of 56° C., so that the complement (inactivation) may be destroyed. The antigen is best made from an extract of the liver of a syphilitic fetus. The preferred medium is water, although today alcoholic extracts, which are not as reliable as the aqueous ones, are extensively used. To two parts of the patient's serum are added one part of fresh guinea-pig serum (easily obtained under ether by puncturing the heart) and one part of the extract. Each of these substances is diluted with a salt solution to one c.c. (for 0.2 c.c. of serum). The mixture is then placed in an incubator whose temperature is 37° C., and it is kept there for one hour, so that the complement may eventually be combined with the other substances. Afterwards there is added to the fluid one c.c. of rabbit serum that has been immunized by injecting the red corpuscles of a billy-goat or a nanny-goat (at Johns Hopkins Hospital a sheep is used). Prior to making the Wassermann test, the potency of the fluids should be exactly determined. The last addition is one c.c. of a five per cent. emulsion of red corpuscles from a goat or a sheep. After this is made, the fluid is again placed in an incubator for an hour and a half; then on ice during the night, after which the absence or presence of hemolysis is estimated. If all the materials have been used in the way which I have described, the successful outcome of the test is dependent on the absolute exactness in testing the potency of the antigen and complement, and the patient's serum for hemolysin. Besides this, a control must be made with normal serum by the same procedure. I also usually control with a known syphilitic serum.

The above description cannot but illustrate the difficulty of having all materials on hand at the same time. And here it would be well to emphasize that all alterations of this method, which might tend to facilitate it, are unreliable, especially when alcoholic extracts are used, though these have the quality of remaining unchanged for a long time; hence, to make the test reliable, the extract that is used should be an aqueous one. An aqueous extract can be obtained by thoroughly drying, over sulphuric acid and calcium chloride, finely minced syphilitic tissue, which, when kept cool and deprived of light by being placed in a sealed container, will remain active for several months. The Noguchi improvement on the Wassermann test, which meant the distribution of several substances dried on filter paper, requires, nevertheless, others which cannot be dried (complement and red corpuscles).

To review all that has been written on the subject of the Wassermann test during the last two years is almost impossible. Although my desire has been to get hold of everything published on this subject, I am sure I have overlooked more than two-thirds of the articles. A majority of the reports are quite worthless, since they do not evidence that the results were based on correct examinations. Again, all the reports of cases

examined by methods indicating modifications of the original Wassermann test are far from satisfactory reading. On account of this, I may add, I have noted a tendency in the writings of the last two years to advocate the return to the original Wassermann method. In 1906 Wassermann, Neisser, and Bruck published the first accounts of their observations, but since then the amount of the output on this subject has been so excessive that no human being can follow it. A few articles, however, are of undeniable worth, and from these I intend to quote. Bruck and Stern in their paper recant their former explanation of the reaction by an amboceptor and antigen. They agree with the suggestion of others that the reaction is the effect of a precipitation. Since their object was to contradict what they had previously said, there cannot be any doubt that their interpretation is the correct one. Nevertheless, they insist that a specific substance is present in the reaction, which is only influenced by contact with other substances that allow the first substance to produce the reaction. These substances are of lipoid character, and by combination with cytoplasmic groups cause these to give a positive reaction. Liefman maintains that a precipitation must occur in this reaction, and Jacobsthal asserts that he observed this phenomenon by using the ultramicroscope. Wassermann also reports that the precipitate can be macroscopically demonstrated in the test-tube.

This change of opinion shows that the logical connection of the different findings has not resulted in a thoroughly satisfactory understanding of the agglutination. Besides precipitation, some investigators have found agglutination of the red corpuscles. Hence, the expectation must be that a return to the first explanation of Wassermann's amboceptor and receptor action will be the final result. The whole discussion of the lipoid character of the reaction has not been rewarded by the same consensus of opinion as has the subject of antigens procured from normal organs. Ehrlich's side-chain theory explains this, on account of the receptors not being new formations in the organism due to external influences, but physical and chemical portions of the cells, which serve as a means for the introduction of assimilable bodies with physical and chemical affinities. A definite opinion can be achieved only by studying closely the cultivation of the *spirochæta pallida*. The outlook from this sort of study has already a hopeful note. Up to the present the cultivated *spirochætæ* have proved to be avirulent for rabbits and monkeys.

As regards the diagnostic importance of this reaction, the different views as to its value depend upon isolated cases. Syphilis has been diagnosed for so long a time clinically that even to-day, on account of our pursuing similar methods, the reaction is like any other bacterial reaction, in that it is only a confirmatory factor in the diagnosis; of no necessity, for instance, after the *spirochæta* has been found, or when the signs of the disease are so well marked that a clinical diagnosis is easily effected. Its great value, however, is illustrated in those conditions in which obscure changes, not recognizable by the ordinary methods of diagnosis, suggest a specific causation, or in those cases in which a positive diagnosis cannot be made, on account of the seat of disturbance being so far removed from ocular demonstration that a positive opinion cannot be expressed. To the latter belong all cases of cerebral or spinal syphilis, of syphilis of the bones and the internal organs, and even the lungs. In these doubtful cases the Wassermann reaction is our best means to arrive at a diagnosis; but this fact must not be neglected—namely, the reaction is a systemic one and cannot prove that the suspected lesion is of specific

origin; just as the tuberculin reaction is systemic and not always reactive even in the involved foci in the lung. The Wassermann reaction is declarative only of the presence of active syphilis.

At present, the published reports, as to whether treatment should be influenced by the presence or absence of a positive Wassermann reaction, are unsatisfactory in that a clear interpretation of what should be done cannot be accomplished. This is due to the fact that a large number of these reports contain contradictory statements.

A negative Wassermann reaction may mean a temporary disappearance of the spirochætæ from the lymphatic and vascular structures, but it does not mean that the spirochætæ are not present in lesions of a fibrous character, which are poorly supplied with blood; hence, the conclusion must be that the negativeness of the Wassermann reaction does not indicate that all the spirochætæ are destroyed. In case treatment has been instituted during the first stage of the disease, the reaction may be negative from six to eight weeks afterwards, though two or three months later active secondary lesions or ulcerations may appear. In a case which I saw, the primary lesion dated back fifteen years. Treatment had been administered by injections, inunctions, and internal doses of mercury together with iodide. Treatment covered a period of two and a half years. Until 1909 patient was free from any recurrences and enjoyed good health. He consulted me on June 1st, 1909. The Wassermann reaction was negative. Patient returned on December 6th, 1909, showing massive moist condylomata around the anus with millions of spirochætæ. Similar reports have been made by other observers; therefore, the absence of a positive Wassermann reaction cannot be considered for medical practitioners as an indication that treatment should be stopped. In other words, the Wassermann reaction, whether positive or negative, should not influence the attending physician as to the course of treatment which he ought to pursue. Whether more extensive observations will change this view, it is impossible to say at present. The time, since the reaction was first used, is too short to arrive at any other opinion.

SYPHILIS OF BONE: X-RAY DIAGNOSIS.

REVIEW OF CERTAIN LITERATURE—RECENT AND REMOTE.

By E. H. SKINNER, M. D., of Kansas City.

1. Friedrich: Ueber Knochensyphilis im Roentgenbild. (*Zeitschr. fuer Roentgenkunde*, Band 12, Heft 1. January, 1910.)
2. Horwitz: Differential Points in the Character of the Bone Lesion in the Tuberculous and Acute Osteomyelitis, Rachitis and Syphilis. (*Interstate Med. Jour.*, Vol. XVII., No. 7, July, 1910.)
3. Diefenbach: Roentgen Ray Diagnosis of Diseases of Bone. (*American Quarterly of Roentgenology*, Vol. II., No. 3, September, 1910.)
4. zur Verth: Knochenveraenderungen bei Lues Hereditaria heranwachsender Kinder im Roentgenbild. (*Zentralblatt fuer Roentgenstrahlen*, &c. (Band I., Nr. 9 und 10, pp. 271, November, 1910.)
5. Fritsch: Die "Tibia en lame de sabre" als Folge der erworbenen Lues des Erwachsenen. (*Fort a. d. Gebiete d. Roentgenstrahlen*, Band XVI., Heft I., October, 1910.)
6. Rotch: The Roentgen Ray in Pediatrics. Textbook and Atlas. (J. B. Lippincott Co., 1910.)
7. Spillman: Syphilis Osseuse. (G. Steinheil, Paris, 1909.)
8. Goldthwaite, Painter and Osgood: Diseases of the Bones and Joints. (D. C. Heath & Co., Boston, 1909.)
9. Rumpel: Ueber Geschwuelste und Entzuendliche Erkrankungen der Knochen im Roentgenbild. Atlas. (Lucas, Grafe & Sillem, Hamburg, 1908.)
10. Hahn and Deyche-Pascha: Knochensyphilis im Roentgenbild. (Lucas, Grafe & Sillem, Hamburg, 1907.)
11. Brown: Roentgenological Study of Certain Manifestations of Syphilis. (*Amer. Quar. Roentgenology*, Vol. I., No. 4, July, 1907.)
12. Skinner: Roentgenological Discussion of Bone Lesions. (*Interstate Medical Journal*, Vol. XV., No. 5, May, 1908.)
13. Stadler: Ueber Knochenerkankungen bei Lues Hereditaria tarda. (*Fort. a. d. Gebiete d. Roentgenstrahlen*, Band II., Heft 2, 1907.)
14. Ware: Radiograms of Syphilis of the Long Bones. (*Jour. of Cutaneous Diseases*, Vol. XXV., No. II., November, 1907.)
15. Adami and Nicholls: Principles of Pathology. Vol. II., p. 1029. (Lea & Febiger, 1910.)
16. Preiser: Ueber Knochenveraenderungen bei Lues Congenita tarda. (*Fortschritte a. d. Gebiete d. Roentgenstrahlen*, Band XII., p. 81. 1908.)
17. Haenisch: Beitrag zur Roentgendiagnostik der Knochensyphilis. (*Fortschritte a. d. Gebiete der Roentgenstrahlen*. Band XI., No. 6, 1907.)

18. Koehler: Typische Roentgengramma von Knochengummen. (*Fort. a. d. Gebiete d. Roentgenstrahlen*, Bd. X., No. II., 1907.)

It is possible to project the gross pathological changes of bone-tissues upon the technically perfect *x*-ray negative with astonishing diagnostic satisfaction. By the technically perfect plate we do not necessarily refer to negatives which have been developed to a degree of accuracy and detail obtainable only by experts familiar with photographic chemistry, but to that class of negatives which does provide sufficient bone detail to warrant interpretative probabilities of periosteum, cortex and medulla. Such negatives at the present time are within the reach of almost anyone possessing only ordinary *x*-ray equipment. Good pictures of bone are within the elementary field of *x*-ray effort at the present day. The interpretation of such negatives requires close application and study. A knowledge of the probabilities and possibilities of bone pathology must be the first requisite upon which to base interpretative estimation of the projected pathology displayed upon the *x*-ray negative.

In the interpretation of all negatives, and more especially bone radiographs, it must be remembered axiomatically, that the increased densities due to infiltration, exudation and deposition of osteal cells with inherent lime salts, produce lighter areas upon the negative due to impenetrability by the *x*-ray. Conversely, areas which have lost lime salts, trabeculae, and their normal densities through erosion, necrosis and osteoporotic processes, show up darker shadows upon the negative, as the *x*-ray readily penetrates these areas. The photographic reproductions or positives of these negatives, of course, show the reverse of these shadows, *i. e.*, all dark spots upon the negative show light upon the prints, and vice versa.

Goldthwaite (8) says: "In the diagnosis of luetic bone- and joint-disease the history of hereditary taint and of venereal lesion or secondary manifestations of the disease are obviously most significantly important. Many of the types will be readily recognized after clinical experience, but here again we have in the *x*-ray our most trustworthy aid in diagnosis, if the technique is good and we train ourselves in the interpretation of these radiographs."

A careful perusal of roentgen literature upon bone syphilis has aroused a suspicion that the various articles have been written around a limited number of observations. This is not surprising, considering the short space of fifteen years which has been given to roentgen diagnosis. The satisfactory element in these various papers and atlases is the unanimity of diagnostic conclusions, which can be drawn from *x*-ray examinations of syphilitic bone. The classification of syphilitic bone types by the *x*-ray negative can be diagrammatically accomplished by close attention to modern pathological knowledge of the subject under discussion.

The pathological classification of Adami (15) lends itself aptly to the purposes of this discussion. There are the two distinct divisions of *congenital* and *acquired* syphilis. The congenital involvement produces changes in the epiphyseal areas of ossification, and displays itself as an osteochondritis. A proliferative periostitis of the shafts of the long bones is a second division of congenital involvement. The acquired type prefers to attack the periosteum of the long bones with osteoplastic formations or establishes gummatous areas in the periosteum, marrow or cortex of a bone or bones. While included within the category of bone gumma, it is well to call attention to a distinct type of syphilitic osteomyelitis which produces an osteoporosis of the phalanges and the calvarium.

A detailed discussion of the pathology will enable us to interpret our *x*-ray negatives with more satisfaction.

Congenital Syphilis of Bones preferably attacks the epiphyseal lines of ossification in the lower end of the femora. The zone of calcification may become broader and more irregular; the trabecular become thinner with the insertion of islands of cartilage. As the process continues we find the process of ossification more interfered with, the cartilage softens and swells, the epiphyses enlarge and may become separated from the shaft by necrotic areas. In advanced cases, the epiphyses are completely separated and the continued interference with ossification produces a dwarfing of the parts.

A second division of congenital syphilis, entitled *lues hereditaria tarda*, involves the periosteum and corresponds to the tertiary periostitis without gummatous formation of the acquired syphilis. This retarded type involves the periosteum of the long bone shafts. There is marked proliferation of periosteum, with slight involvement of the cortex. No gumma develops, but the constant plastic exudation and proliferation of the osteal layer of the periosteum produces a deformity, simulating a bowing of the bone, which is in reality only a plastic addition to a portion of the bone circumference.

Acquired Syphilis.—Gumma may arise in the periosteum or the bone-marrow. More commonly we meet the localized, flattened, gelatinous elastic swelling. This process may become firm from a granulation process, or produce areas of necrosis similar to caseation. The healing leaves a dense fibrous scar. Periosteal gumma produces considerable erosion and caries of underlying bone, which evolves into an osteoporosis or osteomyelitis syphilitica, and occurs in the phalanges and calvarium with frequency. Gelatinous foci may proceed to purulent necrosis or hyperostosis. Healing may occur by a disappearance of the granulation-tissue and caseous detritus through absorption. The bone may become dense and sclerotic to the density of ivory. Small areas of involvement would probably take the preceding pathological route. If a large area or mass of bone became sequestered with inflammation of the overlying soft parts, the sequence would probably be: exudation, necrosis, discharge and sinus formation.

Having briefly catalogued the pathology of bone-syphilis, we may turn to the projection of such changes upon the *x*-ray negative. First, we must realize that the *x*-ray casts shadows in direct proportion to the densities of the tissues interposed between the excited *x*-ray tube and the sensitized plate. Second, it is necessary to bring the pathology which we are examining in direct apposition to the plate, to avoid distortion and obtain detail of structure. Positions awkward to the patient are frequently necessary. Third, absolute quietude of the part and repose of the patient must be obtained by sandbags, pillows, compression diaphragms, and supports. Close attention to this latter consideration will produce good diagnostic negatives with slow exposures of small *x*-ray equipments. It should be realized that the mere outline of bone contour, which suffices in some fracture cases, will not give us the information such as a negative showing the detail of periosteal area, cortex, and medulla of bone.

Let us adapt the radiographic discussion to the outline of the pathology of a previous paragraph. The *radiographs of congenital bone-syphilis* show the osseous lesions in direct proportion to the amount of rarefaction or loss of bone-salts in the epiphyseal zone, due to inflammation and necrosis, and the deposit of additional lime salts in the periosteal areas

from a proliferative, osteoplastic process. Usually in children, and more frequently than formerly in adults, the *x*-ray shadows of parts may identify other than mere bone detail and include a record of densities of the periosteum, muscle, fascia and skin. We, therefore, need not conclude that the abnormally increased density of periosteum indicates a shadow of organized bone salts. There is no doubt but that this increased periosteal shadow is due to exudates which eventually form hard bone or syphilitic ivory. Congenital syphilis, while it may involve any joint, is seen most frequently, clinically, in the distal femoral, the distal radial, and the proximal ulnar diaphyses, extending into the zone of ossification. The early case may show merely a rarefaction and loss of lime salts, which may attend the disuse of any bone with an immediate or adjacent inflammation. As the process proceeds, we note further light areas of rarefaction, the trabeculae of the cancella stand out as distinct lines in the negative, due to the displacement of osteal cells by inflammatory infiltrates. When necrosis eventuates, we note the outlines of the focal breakdown of these trabeculae and we have the irregular, scalloped, outlined shadow of the necrotic areas. These usually occur in the ends of the diaphysis, first, but extend to the shaft and epiphysis. As syphilitic epiphysitis is usually attended by other osteal involvement; we may find a periostitis of one or more of the long bones, which will serve to differentiate a confused joint picture of syphilis from that of tuberculosis, although usually the tuberculosis is in the epiphysis primarily. This syphilitic necrosis at the diaphysio-epiphyseal junction may lead to complete separation of the epiphysis. The swelling and thickening of the periosteum may lead to the faulty clinical estimation of fracture or dislocation of the epiphysis with callus formation. The *x*-ray negative will provide a correct diagnosis in such cases. Rotch (6, p. 199) mentions having seen cases of separation of the epiphyses in the wrists of infants, which had been mistaken for and treated as fractures, the thickened periosteum being mistaken for a callus. If such separation occurred in syphilis, the erosion of the growth-zone would provide lighter shadows of the areas of necrosis, with darker shadows of the periosteal exudates. In traumatic separation there would be no disturbance of the bone trabeculae accompanying the displacement, although there might be much similarity between the shadows of periosteal effusion and callus, both being identical processes of nature marshalling her phagocytic army, the former for offense and the latter for defense.

Besides the periosteal effort in the neighborhood of congenital joint-syphilis, we may encounter a periostitis of the long bones, which may be a complication of the joint or a separate syphilitic demonstration. As a distinct entity it is usually presented to our attention in the sabre tibia. The condition of sabre tibia is a frequent development of the tertiary period of acquired syphilis, and is considered as an evidence of retarded syphilitic manifestation in the congenital. The course is one of periosteal effusion, exudation, infiltration, hyperostosis and deposition of osteal cells, which, in turn, is followed by an ivory sclerosis. There is a certain amount of gummatous infiltration of the cortex from the contiguous periosteal involvement. The bowing of the tibia is described by Fritsch (5) as due to more sclerotic change than is necessary to replace the gummatous periostitis, which promotes a crimping or buckling of the tibia, as the fibula is usually not concerned, the fibula maintains the length of the leg. The radiograph shows a normal fibula, but the tibia presents darker shadows of the portion of the tibia involved. It appears as if bone substance has been plastered upon portions of its circumference. Ware

(14) states that where this tibial circumferential thickening is upon a portion of the bone contiguous to the interosseous space, it could only be accurately recognized by the radiograph, and contends, in contradistinction to Fritsch, that the sclerosis following a gummatous periostitis plus a growth of the length of the bone, due to irritation, with the fibula maintaining the normal length, produces the bowing of the tibia. A similar phenomenon in the bones of the forearm is often encountered.

The *radiographic diagnosis of acquired syphilis* will depend upon the amount of osteal involvement. We usually look for these tertiary complications in the tubular bones of the legs and arms and the plates of the skull. The syphilitic invasion of the nose and palate, because of their anatomical locations, do not lend themselves to x -ray demonstration. The latter are usually so evident by inspection and palpation that the x -ray offers nothing of value.

The syphilitic attack upon periosteum primarily displays itself radiographically by a cloudy shadow of the periosteal area, which is broader than normal. As the process increases we note a more distinct outline of the periosteum, with flecks of ossifying centres. If the process does not recede, we find that this ossification of the exudate resembles a layer of plaster upon the normal contour of the bone. If the cortex has become involved, without the formation of distinct areas of gummatous degeneration, this plaster process casts dense shadows, showing the osteosclerosis of cortical and periosteal areas. Where the cortex beneath an involved periosteum develops gummata, these gummata will appear as lighter spots surrounded by a darker zone of inflammatory exudate. The changes described in this paragraph are usually displayed in the tubular bones of the leg and forearm. Friedrich (1) states that a characteristic roentgen finding in syphilis is the combination of a gummatous periostitis and ostitis, with an ossifying periostitis and ostitis; an osteoporosis plus an osteoplastic process.

Osteomyelitis Syphilitica, while it may develop as an extension of gummatous periostitis, will most frequently be found as a primary medullary invasion. The most startling demonstration is found in the plates of the skull. The flat bones of the cranium may take on a diffuse sclerosis with osteoplastic processes, but generally an osteoporotic change, with extending suppuration and eventually perforation occurs. Small islands of bone may form which later may be discharged as sequestra with the formation of perforations in the skull plates. The x -ray findings in an osteoporosis of the skull are conclusive; the thickening and plastic growth of the periosteum will be displayed by an increased shadow of this area; the porotic changes will be outlined by increased radiability; the islands of degenerated bone give the plate an appearance of irregular lace-work.

The syphilitic osteomyelitis of the long bones, particularly the femur and humerus, may give rise to few subjective symptoms aside from pain and impaired function, and the condition will not be discovered until a spontaneous fracture occurs, unless the x -ray is used. The x -ray reveals the osteoporosis of the medulla and cortex, with not the amount of periosteal infiltration and thickening that accompanies a primary periostitis gummatosa. The bone upon the x -ray plate appears honey-combed and flecked with dark and light areas of porotic changes. The differential diagnosis between sarcoma, myeloma, and septic osteomyelitis is eminent. The latter may be excluded by the pain characteristics, temperature record, and blood count. Syphilitic osteomyelitis is confined to the normal shaft area of the bone which, with periosteal thickening, produces a

fusiform shadow. Sarcoma will usually break through the periosteum and invade the soft parts. Further, appropriate internal medication will promote the healing of the syphilitic case in a space of time insufficient to allow of much progress in a sarcoma.

Syphilitic dactylitis is encountered in the metacarpal and phalangeal bones. It is readily differentiated from the tubercular dactylitis by the fact that syphilis appears to veil the bone with several layers of periosteal plastic overgrowth, while the tuberculosis involves the medullary portion, forming a necrotic area which is easily recognized by the x -ray.

Charcot Joint.—Inasmuch as we now attribute almost all cases of tabes dorsalis to syphilis, this may be regarded as a tertiary manifestation of acquired syphilis. The x -ray negative displays the rarefaction and atrophic erosion of the articular extremities of a joint, with the deposit of calcareous debris within the distended joint confines. Luxations of the joint frequently prevails. Brown (11) states that "the exuberant bone formation may involve the capsule, synovia, ligaments, tendons and muscle attachments, which shadows may obliterate the atrophy obtaining in the articular extremities." It must be realized that while the majority of Charcot joints are presented in the knee, this condition may occur in other joints, particularly of the ankle and elbow.

General Considerations. zur Verth (4) draws attention to a transverse line shadow in the diaphysis running parallel to the epiphyseal line, which displayed itself in the tibial head of a case which subsequently developed a syphilitic spina ventosa of metacarpal phalangeal bone. Also, while not disparaging the contention of Rumpel (9), Hahn and Deyche-Pascha (10) that general bone atrophy is a manifestation of congenital syphilis, he believes with Preiser (16) that this bone atrophy is distal to luetic lesions, but when universally distributed in the bones of the body is indicative of rachitis. zur Verth considers that evidence of keratitis parenchymata and a positive Wassermann reaction are elements that demand attention in the interpretation of radiographs.

Haenisch (17) reports two cases in which the "diagnosis of bone syphilis was accomplished and calls attention to the desirability of making x -ray exposures of the lesion at intervals to determine whether anti-syphilitic treatment of a given case is promoting a recession of the bone involvement." Where the differentiation between sarcoma and syphilitic osteoporosis was doubtful, it would be possible to note within a month's course of the iodides, mercury, or now "606," whether there was change for the better.

Horwitz (2) gives some good axiomatic points of differentiating the bone lesions of syphilis, rickets, tuberculosis, and osteomyelitis. We quote (with some liberties): "Osteomyelitis and syphilis may be termed constructive; rickets and tuberculosis, destructive. Tuberculosis attacks the epiphysis and only, secondarily, enters the diaphysis; osteomyelitis, shaft first and epiphysis by extension. Syphilis has predilection for periosteum, showing irritation and consequent proliferation. Rickets shows thickening of cortex, always upon the concavity of the bone; syphilis usually shows thickening upon all sides. Osteomyelitis and acquired syphilis show comparative freedom of joint involvement. Congenital syphilis, on the contrary, presents unilateral osteochondritis of the growth zone."

CORRESPONDENCE

PARIS LETTER.

THE RÔLE OF SYPHILIS IN VISCERAL PATHOLOGY.

By AUGUSTE A. HOUSQUAINS, M. D.

Only a few years ago, syphilis was defined either as an indurated chancre, a secondary eruption, or as a gumma. The inoculation of animals, the discovery of the pathogenic agent, the study of serum reactions, the progress in the therapy and clinical analysis, all these advances, have greatly widened our knowledge of syphilis. To-day we are aware of the fact that a thorough study of syphilis should be made in chronic visceral lesions, in lesions of the central nervous system, such as tabes, general paralysis, and hemorrhage; in lesions of the liver and kidneys, and in diseases of the stomach.

Formerly these affections were considered completely independent of syphilis; but directly we became convinced of their frequent coincidence with syphilis the expression, *parasyphilitic*, was created to indicate the non-specific character of their pathological histology. This expression, however, is not considered accurate at the present time. In fact, it is no longer thought doubtful that these chronic visceral lesions are due to syphilis, since their pathological histology can be traced back to the presence at one time of the initial lesion. The study of chronic infections has demonstrated to us that all microbial diseases can assume aspects which have nothing characteristic from the standpoint of etiology. Thus tuberculosis, for example, which at times assumes the form of septicemia so decidedly that at an autopsy no trace of a tubercle can be found, may cause the ordinary attacks of cirrhosis of the liver and nephritis. Nevertheless, these lesions are of tuberculous origin, according to our clinical and bacteriological teachings. It is absolutely the same in syphilis; hence, it is not reasonable to call the lesions, which are undoubtedly directly dependent on the primary sore, *parasyphilitic*.

The study of the histopathological processes in syphilis is of the greatest interest, but the matter of specificity plays no part in these processes, if a truthful statement be made. Nevertheless, there exists a combination of sufficiently different characteristics which permits us to recognize a syphilitic lesion.

In the first place, there is a period of incubation during which the *treponemæ* vegetate locally. This is the intra-epithelial period. Then the infectious agent passes through the epidermis, attacks the vessels, becomes general throughout the system, and is again seen in the first exanthem.

Afterwards, the syphilitic agent manifests itself, in a histological sense, by causing divers lesions; a dermic filtrate in the manner of papules; a syphilitic folliculitis, which is nothing else than a gumma; and an arteritis and a phlebitis. On a level with the surface of the viscera, a cell can be affected by syphilis without there being an arteritis; however, arteritis is present in the majority of visceral syphilitic changes. The cure is best effected by a fatty, granular degeneration, or better by a fibro-sclerotic transformation. These changes take place in the brain, marrow, kidneys and liver, and cause the continued destruction of the healthy elements of the tissues.

These indications illustrate that there is no interruption in the evolution of histological alterations, and consequently, that there is a continuity in the development and the connection of the various clinical manifestations of syphilis. Let us take, for example, the nervous disturbances classed under the name of parasyphilitic affections. The recent work of Babinski, Widal, Nageotte, and Ravaut has demonstrated that these nervous disturbances are frequently preceded by a chronic meningitis of a syphilitic nature. Therefore it would be wrong to say that in these cases there was an interruption between the secondary period and the morbid phenomena which appeared later on. Without doubt, chronic syphilitic meningitis can remain latent, and it is possible to disclose the true nature of the disease if a thorough study is brought to bear upon it.

It is true that this sort of research is not always easy to make, for it is rather difficult to prove in the living that chronic meningitis is the certain intermediary between recognized nervous troubles and a previous syphilis. "In order to prove this," says Clovis Vincent, "it is necessary to make, from time to time, a lumbar puncture in all those syphilitics who appear to be free from nerve lesions." But, as we all know, when a patient has no pains he refuses almost always to submit to any procedure. Therefore, a lumbar puncture is hardly ever made until the appearance of acute nervous disturbances. But the verification of the diagnosis of meningitis made by means of a lumbar puncture does not imply that the meningitis preceded the nervous disturbances. Nevertheless, even in these cases Clovis Vincent believes that we ought to admit that chronic meningitis had already existed. He bases his opinion on the fact that, whenever he has had occasion to examine patients presenting nervous disturbances which could be imputed to syphilis, at a time when the nervous disturbances were in their incipency, the lumbar puncture revealed a rachidian lymphocytosis. Following this opinion, he has punctured syphilitics afflicted with hemiplegia, directly there was icterus, others having simply a lingual hemiatrophy, paralysis of the third, sixth, and eighth pairs of nerves, and even those patients who presented only one symptom—the Argyll-Robertson pupil. In all these cases he found considerable meningeal reaction. Other observers have already made similar assertions; hence, from the ensemble of these facts we gather that all nervous disturbances of syphilitic origin are accompanied by meningitis. The three cases of Vincent indicate the fact of the anteriority of meningitis. These cases were three well-marked examples of syphilis in which the diagnosis of meningitis could be well established before the appearance of the nervous disturbances, and this was done by means of the lumbar puncture. In one of the cases was observed, somewhat later, a progressive general paralysis; in the second, a tetraplegia with a pseudobulbar syndrome; in the third, a neuritis of the eighth cranial pair of nerves with bilateral deafness.

Thus we can understand how an old syphilis can develop a general paralysis or tabes, some years after the appearance of the initial lesion. This is due to a meningitis in a state of slow but uninterrupted evolution, by which gradual changes are produced in the nerve elements. Hence the physician should regard those patients who, after the disappearance of the secondary eruption, continue to present a cephalorachidian lymphocytosis, as special subjects for nervous disturbances. The therapeutic conclusion is this: we should continue to administer the antisiphilitic treatment in these cases as long as the lumbar puncture yields a positive result.

It is highly probable that the condition, which is caused by lesions of the central nervous system, can be reproduced when there are chronic changes in the viscera: diseases of the liver, kidneys, and lungs that supervene later on in patients who have had syphilis for a number of years. There is undoubtedly an intermediary stage which cannot be recognized at the time by the physician, but during which alterations in these organs take place. As regards the nerve lesions, we are justified in saying that the arterial constitute the most formidable complications of syphilis. The study of chronic aortitis, in particular, if one analyzes it in connection with syphilitic infection, offers a subject of the greatest interest. Syphilis can, in fact, cause in the secondary and tertiary stages changes which are easily recognized as specific, or later on lesions that have the ordinary aspect of arteritis, atheroma, and aneurysm: diseases which at first sight would not be attributed by the physician to syphilis, but which, by means of more extensive study and the employ of laboratory methods, prove to be of syphilitic origin. These lesions are in reality much older than they appear to be. They are present prior to the time when the first clinical manifestations become apparent; in fact, they date from the time the *treponemæ* penetrate into the blood, just as tabes, which is a later complication of syphilis, has its anatomical beginning in the latent meningitis of the secondary period. If, in any of these cases, there is any doubt as to the symptoms being due to a former syphilis, the laboratory methods will lend considerable support to any clinical deficiency, and the Wassermann reaction can be of the greatest service. Debove does not hesitate to say that chronic aortitis has a diagnostic value in arriving at the conclusion of the existence of an old syphilis. Its coincidence with the nervous disturbances suffices, from his point of view, to show the fact of their syphilitic origin.

Although the facts mentioned above are not, as yet, absolute certainties, the number and value of the observations upon which these facts are based constitute presumptions which should impress all of us as to their worth and value. In all the cases in which my doctrine of parasymphilis has been adopted, it has rendered considerable service as regards the grouping of facts, the interpreting of them and the furthering of more and more careful researches. Furthermore, the explanation of the delayed complications in the last stages of the evolution of syphilis is simple enough to make us hopeful that the lesson will be understood by all physicians. The connecting links in the chain reach uninterruptedly from the last complications to the initial lesion; and though we have hitherto denied this on account of our incapacity to demonstrate each and every step, our present attitude is such that we are in a position to recognize the importance of the rôle of syphilis in the pathogenesis of a large number of chronic visceral diseases.

December 10th.

BOOK REVIEWS.

NERVOUS STATES. By Dr. Paul Dubois, Professor of Neuropathology in the University of Berne; Author of "The Psychic Treatment of Nervous Disorders," "The Influence of the Mind on the Body," etc. New York; Funk & Wagnalls Co. 1910.

This book is very Doboisesque and is the concentration of the ideas of that master of neurologic theology. The vogue of Dubois and his special kind of psychotherapy is perhaps passing, but, nevertheless, anything from his pen is of interest. Dubois, compared with the vigorous and vital conception of Freud, seems tame, but at the same time there is no doubt that there is a place in therapeutics for his method, which is practically that of personal influence and persuasion. If his larger book pales a little and seems needlessly diffuse and preachy, this miniature will be in a refreshing contrast. "Nervous States" can therefore be recommended as an easy sermon on how to cure a patient by the method of talking him out of it. Loquaciousness as a therapeutic agency has yet to be developed; perhaps this book is the beginning.

HANDBOOK OF PHYSIOLOGY. By W. D. Halliburton, M. D., L. L. D., F. R. C. P., F. R. S., Professor of Physiology, King's College, London. Ninth Edition (being the twenty-second edition of Kirkes' Physiology), with nearly six hundred illustrations in the text, many of which are colored, and three colored plates. Philadelphia: P. Blakiston's Son & Co., 1910. Price, \$3.00.

The new edition of this work fully demonstrates the painstaking care of the author in his endeavor to bring the subject-matter up to date. Most of the chapters have been entirely rewritten. The greatest change is seen in the sections dealing with the physiology of the central nervous system and the ductless glands. The chapters on the physiology of the brain, especially, have been changed in accordance with the results of modern research. The book is well illustrated; the style logical and clear. The work, as a whole, will undoubtedly prove a source of pleasure as well as advanced instruction to every student of physiology.

PRACTICAL NURSING—FOR MALE NURSES IN THE R. A. M. C. AND OTHER FORCES. By Major E. M. Hassard, R. A. M. C., and A. R. Hassard. New York: Oxford University Press. 1910. Price, \$1.50.

In a book for army nurses, such as this, the instruction in what to do in emergencies is necessarily more detailed than in textbooks for hospital nurses. The description of the various first-aid procedures is full and clear and may well meet the requirements of the young practitioner as well as of the male nurse. Under the circumstances, too, it is not surprising that much space is given to tropical diseases.

HYGIENE AND PUBLIC HEALTH. By B. Arthur Whitelegge and George Newman. Illustrated. New York: Funk and Wagnalls Company. 1910.

This manual provides a concise summary of the current knowledge concerning public health for the purposes of the health officer, as well as an elementary textbook for the student. The conditions discussed in it are primarily those obtaining in England, but this makes it if anything even more suggestive to the American. In many respects, it is clear, the English manage their public hygiene better than we.

NEUE FORSCHUNGEN AUF DEM GEBIETE DER INTESTINALEN AUTOINTOXIKATIONEN UND IHRE BEHANDLUNG. Von Sanitaetsrat Dr. C. Wegele. Wuerzburger Abhandlungen aus dem Gesamtgebiet der praktischen Medizin. X. Band. 8 Heft. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1910. Price, 85 pf.

A critical review by an eminent clinician of recent work in intestinal auto-intoxication.

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THE PRACTICE OF SURGERY. By James G. Mumford, M. D., Instructor in Surgery in the Harvard Medical School. Octavo of 1015 pages, with 682 illustrations. Philadelphia and London: W. B. Saunders Company. 1910. Price, Cloth, \$7.00; half morocco, \$8.50.

PRACTICAL BACTERIOLOGY, BLOOD WORK AND ANIMAL PARASITOLOGY—Including Bacteriological Keys, Zoological Tables and Explanatory Clinical Notes. By E. R. Stitt, A. B., Ph.G., M. D., Surgeon U. S. Navy; Associate Professor of Medical Zoology; Philippine Medical School. Second Edition, Revised and Enlarged, with 91 Illustrations. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$1.50.

CASE HISTORIES IN PEDIATRICS. A Collection of Histories of Actual Patients Selected to Illustrate the Diagnosis, Prognosis and Treatment of the Most Important Diseases of Infancy and Childhood. By John Lovett Morse, A. M., M. D. Assistant Professor of Pediatrics, Harvard Medical School; Associate Visiting Physician at the Infants' Hospital and at the Children's Hospital, Boston. Boston: W. M. Leonard. 1911. Price, \$3.00.

THE BLUES—Causes and Cure. By Albert Abrams, A. M., M. D. (Heidelberg), F. R. M. S. Consulting Physician, Denver National Hospital for Consumptives, The Mount Zion and the French Hospitals, San Francisco; President of the Emanuel Sisterhood Polyclinic; Formerly Professor of Pathology and Director of the Medical Clinic, Cooper Medical College, San Francisco. Illustrated. Fourth Edition. Revised and Enlarged. New York: E. B. Treat & Company. 1911. Price, \$1.50.

THE WORK OF THE DIGESTIVE GLANDS. Lectures by Professor I. P. Pavlov, Director of the Physiological Section of the Imperial Institute of Experimental Medicine, and Professor in the Imperial Military Academy of Medicine, St. Petersburg; Foreign Associate of the Academy of Medicine, Paris, etc., etc. Translated by W. H. Thompson, Sc. D., M. D., F. R. C. S. (Eng.) Second English Edition. Illustrated. Philadelphia and London: J. B. Lippincott Company. 1910.

PRIMER OF HYGIENE. By John W. Ritchie, Professor of Biology, College of William and Mary, Virginia and Joseph S. Caldwell. Professor of Biology, George Peabody College for Teachers, Tennessee. Illustrated by Karl Hassmann and Hermann Heyer. New York: World Book Company. 1910.

BISMUTH PASTE IN CHRONIC SUPPURATIONS—Its Diagnostic Importance and Therapeutic Value. By Emil G. Beck, Surgeon to the North Chicago Hospital, Chicago, Ills. With an Introduction by Carl Beck, M. D., and a Chapter on the Application of Bismuth Paste in the Treatment of Chronic Suppuration of the Nasal Accessory Sinuses and the Ear. By Joseph C. Beck, M. D. With Eighty-One Engravings, Nine Diagrammatic Illustrations, and a Colored Plate. St. Louis: C. V. Mosby Company. 1910.

A TEXTBOOK OF GYNAECOLOGICAL SURGERY. By Comyns Berkeley, M. A., M. D., B. C. Cantab., F. R. C. P. Lond., M. R. C. S. Eng. Gynaecologist and Obstetrician to the Middlesex Hospital, Senior Physician to the City of London Lying-in Hospital, and Victor Bonney, M. S., M. D., B.Sc. Lond., F. R. C. S. Eng., M. R. C. P. Lond., Assistant Gynaecologist and Assistant Obstetrician to the Middlesex Hospt. With 392 Figures in the Text from Drawings by Victor Bonney, and 16 Coloured Plates. New York: Funk & Wagnalls Company. 1911. Price, \$5.00.

INTRODUCTION TO PRACTICAL ORGANIC CHEMISTRY—Including Qualitative and Quantitative Analysis and Preparations—With a Special Appendix on the London University Syllabus, and Schemes of Analysis for Stages 1 and 2 of the Board of Education Syllabus. By A. M. Kellas, B.Sc. (Lond.), Ph.D. (Heidelberg), Lecturer on Chemistry at the Middlesex Hospital Medical School, Formerly Examiner in Chemistry to the Conjoint Board of the Royal Colleges of Physicians and Surgeons. New York: Oxford University Press. 1911.

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EDITORIAL.

THE MUCH-ABUSED TITLE OF DOCTOR OF MEDICINE.

In the good old days, as the conventional phrase runs, when simplicity marked our medical sociology, the title of doctor preceding a name, be it never so commonplace, meant a distinction that could not be easily misconstrued. True, even in those times of uncomplicated machinery, a number of disreputables assumed honors which did not rightly belong to them, but, though in certain communities our lax laws allowed this dereliction to wax strong, the acumen of the fairly intelligent stood them in good stead in the matter of differentiating between the real and the bogus article. In short, a quack bore the stigma of his class and, being under the burden of an ostracism that meant considerable cold-shouldering on the part of those whose money would have been thrice welcome, he resorted to the only medium which was open to him through which to announce his virtues to a stubborn public—the daily press. By doing this he declared his complete segregation from those who held diplomas that were worthy of the name; he made money, it is true, but his glory did not last; for being an ordinary human being, in most cases, with a too evident desire to reap the richest harvest, he played to a contingent in a community that wants something in return for its money, though in the beginning it may be dazzled by bombast. And so before long, the fat, gilt lettering, which had beautified the time-worn brick front of the building which housed the quack—old buildings were always preferred, perhaps, because quackery is so much older than real medical science—vanished, as if by magic; the cobwebs returned to their former haunts; and “Ichabod, thy glory is departed” was the message to be garnered by the wary. Strange, as it may seem, the meretricious irrup-

tions of this special form of quackery into communities was lightly thought of; perhaps, too lightly, but then it must be stated in extenuation of what was a too benign attitude that we were too light-hearted and too childish a people at that time to recognize the value of the inherent beauties and advantages and stringencies of the laws which are with us at present.

With the passing of the sort of quack, whom we have attempted to describe, the qualified practitioner grew more hopeful; and, though he should have known that one evil begets another, he gave but small thought to what was in store for him. This mental attitude was not due to any romantic notions as to what this very real world spelt for him, but rather to the fact that with the obstreperous and ubiquitous quack out of the way, there was no need to fear that any serious molestation could arrive from other sources. In short, he believed that the title, which he bore with considerable pride, would not again be tarnished by anyone whose practices might be construed, by the unthinking part of the laity, as similar to his own. Complaisance such as this was bound to be disturbed, especially in the medical profession, the door of which for some unexplainable reason is always too greatly ajar; and before many days elapsed the blazed trail, which had been deserted since the quack had been uprooted, was again invaded by those whose ways were gentle when compared with the sensational outpourings of their predecessors, but whose obscure workings and general lack of medical education nevertheless made them an undeniable menace to the fair name of doctor.

Now, since this is the case, what recourse has the reputable physician when he hears that the irregulars and opticians, having taken their courses of studies, are just as much entitled to the much-coveted prefix as he is, though they may have pored over their peculiar studies only for a month or a year—and a very short one at that—while for him to arrive at his goal meant achievement by the sweat of his brow? True, he will be told by his fellowmen in the ranks of medicine that his superiority to the “others” is so apparent that he need fear no harm from invidious comparisons, even when these are made by people who ought to know better; that the laws are ever and ever increasing in stringency; and that before long—what a convenient phrase “before long” is!—the wrongs, which now grate on his nerves, will be righted. But these words, which fairly drip with the optimism that one would apply to a recalcitrant child that grows restive under imaginary wrongs, are really wide of the mark, not only because their reiteration has robbed them of their pristine strength, but because the initiated know that they are offered in the spirit of a makeshift. They are sure of this because on

all sides there are evidences that the improvements so much talked about are not apparent, even to the most observant, and that the supineness which permeates the rank and file of humanity continues to make light of a differentiation between the holder of a diploma from a medical college of standing and the offspring of a frayed alma mater, so long as the cabalistic prefix declares the latter to be one of the elect.

After studying the conditions, as they exist in all our large cities, are we wrong in saying that it would be advisable for the qualified practitioners to take the matter in their own hands, if they hope for a fruition of the desire to elevate the title of doctor of medicine to the heights upon which it rested until it was dragged through the mire by the unscrupulous? Would it be futile to evolve a plan such as this: All qualified practitioners be compelled to write "doctor of medicine," *i. e.*, Dr. med. in front of their names?—a compulsion that should show no laxity, since its object is not only to instruct the people at large, but prevent the osteopath, the optician and others too numerous to mention, from arrogating to themselves an honor that, on account of its bastardy, is to-day an exceedingly commonplace designation. Now this may sound Utopian, but it is done in other countries—namely, in the German speaking ones, where systematization is a cult that it would be well for us to follow. Of course, there is no denying that this would be a slavish imitation of something that is foreign—hence, despicable; but despite this apparently insuperable drawback, and not overlooking the awkwardness of the more elaborate designation, would not the results counteract these and other objections? We think they would, for the reason that almost immediately the line of demarcation would plainly show who is the doctor of medicine and who is the doctor masquerading in soiled and tattered garments that must be cautiously arranged to hide his ignorances.

THE YOKE OF CLEANLINESS.

That decidedly contentious subject, as to what really constitutes personal cleanliness, has at last received the sort of attention that cannot but result in the partial solution of this tantalizing problem. According to our limited readings in various literatures, personal cleanliness is so much a matter of nationality that to argue on the subject is a sheer waste of time; but, though Dr. A. R. Reder, Health Officer of Aurora, Illinois, may be of a like opinion, his undauntedness in the matter proclaims that he is not going to allow the question of nationality to override his earnest

desire to teach the principles of cleanliness, even though force and intimidation have to be called into play. For the mandate has gone forth from his special office in the Temple of Hygiene that the Hungarians, Roumanians, Lithuanians, Slavs, and Mexicans, who make up a goodly part of the population of Aurora, must bathe at least once a week or take the undesirable alternative of going to jail. This drastic conception, of what our future Americans must do to fit in with our advanced ideas, may strike the superficial thinker as altogether too autocratic; but the results are already heartening, and what with other explicit rules laid down by Dr. Reder, which are just as rigorously enforced, no fair-minded critic should withhold his admiration.

When we read, in our leisure moments, those discouraging books, "The American Scene," by Henry James and "The Future in America," by H. G. Wells, we felt that all ideas of Americanizing the unkempt foreigner were wrong; for these students of our sociology saw only the reverse side of the amalgamating process which our exuberance is fostering so that out of crudity, culture and refinement, as we understand it, shall be evolved. The writers we have mentioned, we take it, being followers of the teachings of the late Sir Francis Galton, notably of his "Inquiries into Human Faculty," attached too much importance to inborn capacity and too little to environmental influence; hence, their chapters had an air of gloom. Their literary purblindness limited them to observing the national traits of the unregenerate foreigner to the exclusion of the beneficial fruits of environment. Now, though it is not our intention to combat the theories of those who are staunch in their opinions of heredity, or champion those who know that environment must bear very good lessons for the individual, no matter how obtuse he may be in the beginning, the results which Dr. Reder has achieved must clearly show to all of us that environment is not an altogether negligible factor. In other words, though our American ways of cooking, of talking, of doing business may never be acquired by the foreigner so that amalgamation shall be complete, there are some advantages accruing him by his sojourn among us—namely, the enlightened lesson of the once-a-week bath!

The subject of bathing has been "on the carpet" as often, we imagine, as has the subject of ventilation and draughts. Neither is any nearer solution than it was some decades back; and though the writer of these lines fully recognizes the good points of bathing and the bad points of draughts, all medical writers are not at one on these subjects. For instance, when only a few years ago Metchnikoff of Paris, and Nascher of New York, were telling us why we were senile at the early age of

seventy, did not a German investigator—a medical man, be it understood—make the rounds of his own country and publish statistics which showed that the centenarians he had come across were well preserved, despite the fact that not one had taken a bath in twenty years, and some not in thirty? Now, if we are at all interested in how to prolong life, ought not this to give us pause? But, no doubt, Dr. Reder is of that practicality which sees only the immediate good results of the bath, and is not aware that we need these Hungarians, these Roumanians, these Lithuanians for many years to come to do certain “rough work” that requires a muscular strength which should not be vitiated even by the bath at seven days’ interval. On the other hand, would not Mr. James and Mr. Wells, men who are interested in eventualities, see in the shortening of the lives of the immigrants by bathing, the reasons why a limited number of “American” years in their lives must be held accountable for lack of the complete Americanization which they had hoped to see?

THE AGE FOR RETIRING FROM PRACTICE.

A matter, which has been agitating the younger members of the medical profession for many a day, is the very vital one which may be evolved into the query, Why does it so often happen that medical men, who have long since reached their apogee, continue to practise the art of medicine when retirement would mean a lessening of the competition, which is at present so menacing to the peace of youth ever on the alert to supplant and acquire? The answer to this complicated question is not easy, since it has never been decided by any philosopher of this dire situation just when a man, who is actively engaged in work, should announce to the world his inability to continue in his chosen profession, and declare that the laurels, which he had patiently gathered throughout a large number of years, have no longer any fascination for him. Barrie, the Scottish novelist, some time back wrote a little book, entitled “Better Dead,” in which he set forth his ideas to good purpose; for, with considerable ingenuity, he described the successes of a Society for the Doing Away of Certain Great Men—Gladstone and Bismarck had been singled out—so that their fame should not be weakened by living too long and dying, as Dean Swift did, “at the top.” But so drastic a measure as advocated by Barrie would hardly be countenanced, even by those young men in the medical profession, who are amongst the most enthusiastic to devise some means whereby their monetary condi-

tion might be improved; therefore, a consideration of this plan is out of the question. It would seem, then, that some other method must be pursued if similar results shall be achieved: something that is more humane and that shall not cast odium on the perpetrators. In the meantime, a suggestion has come from abroad that is well worth conserving, for a French court has recently decided that, at the age of sixty-eight, a medical practitioner should be desirous of taking a well-earned rest and be less burdened with the fatigues of practice. We are now speaking of the damage suit brought by Dr. Cheurlot against the owner of a motor-car which had collided with his carriage, and for which occurrence the physician asked 220,000 francs, of which 10,000 were for medical attendance and medicine, 60,000 francs for inability to see his patients, and 150,000 francs for the decrease of his practice on account of limited activity that prevented his seeing as many patients as was his wont. Although the court awarded Dr. Cheurlot only 60,000 francs, we take it the smallness of the sum did not cut so deep into his sensibility as the opinion that at his age, retirement should be his uppermost thought.

What we have just stated should not dishearten our youthful confrères too greatly, for, while it must be admitted that in our very young country the age of sixty-eight is invariably thought of as senility and retirement on the part of the physician to be effective should usually take place some years prior to this, the mere fact that a court has decided that a physician is old at sixty-eight must strike joy into the hearts of all advocates of compulsory obliteration. At least they have a premise upon which to work, and if they will but pursue their thought sedulously and without too much blare of trumpets, they might reduce the age for giving up medical activities from sixty-eight to sixty-five. A few years in other matters do not count for much, but when it is a question of such close competition as obtains to-day in the practice of medicine, the short space of three years may mean that the apportioning of a large clientele, recently relinquished, will yield to some of those, who are in their fortieth year and who have patiently waited for the windfall, at least two if not three patients that would not have been theirs had not the "prominent doctor" seen fit "to step down."

OPINION AND CRITICISM.

THE TRUTH ABOUT MEDICAL ETHICS.

The unsavory pictures of the present state of medical ethics, painted in the daily newspapers of some of our large cities, deserve special attention because most of the light thrown on these pictures has been furnished by well-known members of the profession, and ethics in medicine is no more or less than ethics in any other respectable calling, and in principle is a mere rule of conduct which should govern men of honor. The basic error in a cut-and-dried code of ethics, however, lies in the assumption that all men are honest, and since such a general statement can never hold true, there is no valid reason for presuming that that portion of the human race which enters the study and practice of medicine consists entirely of honest men. Even though medicine may be the most honorable profession, even though traits of character are necessary in a physician, which are not required in any other line of work, doctors are still human and subject to all those temptations which a mere human being finds so hard to resist. Principles of absolute right and wrong have not proved satisfactory in the solution of the world's morals: what is wrong with one generation becomes right with the next, and the customs of one age or of one people constitute the court of last appeal on ethical questions relating to that people. In other words, morals result from conventions made by environmental development and tending toward what for the time being, is the greatest good for the greatest number. Polygamy, to-day, is unethical, not because of any inherent immoral principle, but because civilization has reached a stage in its evolution when monogamy is productive of the greatest good.

Reverting now to medical ethics, it seems well worth the trouble of looking matters square in the face, and of separating the truth from the nonsense. A system based on theoretical ideals of great beauty will be successful only when it is supported by men with corresponding ideals. And it were an idle dream to believe that the thousands of men who enter medicine are able to separate the magnificent opportunities for self-sacrificing endeavor from the business of living. Physicians who spend years in training have the normal right to demand a fair return in wage from their profession. The step from this fair return to the business of making money is short and quick—and then the physician becomes the business man. This brings up a new point of view; if my neighbor who runs a shoe shop can use any honorable means to get customers,

if he can advertise that his shoes last longer than Blank's, why cannot I do the same? Why must I, who know my subjects better than Dr. Jones, wait in my office till some automobile accident sends me a fracture to set? Why cannot I use the same good business methods that my father employed—and my father is an honorable citizen of his community? Old Dr. Gray, who has just returned from Europe, has a column in every paper, young Dr. Green certainly uses methods that are not strictly ethical, yet both are members in good standing in the medical societies, both “enjoy” many comforts of life which I must deny myself, because I adhere strictly to the letter of the code. When I see medical politics running societies, when I see schools where graft and money are the prime reasons for appointments, I cannot help asking “what's the use?”

This point of view is logical and cannot be snickered at or passed over in silence. The invasion of the ideals of practice by the desire of doing a good business is, however, the root of the evil of bad medical ethics, for as soon as commercialism controls medicine, so soon does the structure fall to pieces. To-day, although we have a code of ethics, we have in the profession a much stronger and older passion—the struggle for existence: a passion against which stronger forces than regulated morals have beat their wings in vain. The struggle of the beginner to be decent is unfortunately as a rule, not helped by communion with the men “already there,” too many of whom measure their success by the additional zeros on their bank account. It is a safe commentary on the working of the human mind to say that it is far easier for the man on top to preach ethics than it was for him to practise the same principles when, perhaps, his next meal depended on the arrival of a patient.

The present standard of ethics is theoretically the remedy for the disease, but practically because of the natural limitations of humanity it falls short of its purpose. As a deeper therapeutic endeavor, we suggest the thought that the decrease in the number of physicians, which is bound to result from the bettering of educational requirements, will eventually be one of the most efficacious agents in the fight for cleaner medical morals. As long as the supply of physicians exceeds the demand, so long will monetary considerations remain the basis of practice, and the tentacles of greed in reaching for the needed money of the patient will not hesitate to grasp and destroy the reputation of a neighbor. Further, it is necessary to realize that common-sense interpretation of ethical conduct is more conducive to honesty than blind obedience to any code. He who wants to be honorable will be so, and he who wants to cheat will cheat, whether or not a code exists. All men should be compelled to adhere to common laws of decency and honorable dealing, and infringements of these laws, whether executed by the old and the tried, or by the young, should be considered sufficient ground for an open ostracism.

THE MEIOSTAGMIN REACTION.

In another column of this issue will be found a review of the literature pertaining to the new Meiostagmin reaction. If the enthusiasm of the original investigators has not carried them to the airy flights of imagination, this new work bids fair to be one of the most interesting and most valuable immunity reactions in present-day diagnosis. Like many other biological tests this too has called to its aid the resources of chemistry, and now we have finally a true physico-chemical immunity reaction. The underlying principle is not essentially different from that producing the Wassermann, or other well-known diagnostic tests, being based on the production of specific antibodies by a specific cause; but its application is far more extensive and goes into fields so far untouched by pure biological research. A known agent will cause in the blood-serum of the host the production of certain bodies which, when combined with an extract of the etiological agent, have the effect of changing the surface tension of the serum. Such changes are measured by a properly constructed instrument; and if the original reports are to be believed, there is no difficulty in perceiving the difference between a positive and a negative reaction. The studies, so far undertaken, have shown not only that the test may be applied to the diagnosis of obscure infectious diseases, but that it may also be employed in malignant disease. Further confirmation of the remarkable reports of the Italian workers will be necessary, before too much reliance is placed on the Meiostagmin reaction, since up to the present all attempts, either to procure a definite biological test for the diagnosis of cancer, or to prove the existence of immune bodies in malignant disease, have not met with uniform success. However, the scepticism, which usually follows announcements that cannot but be classed with the unusual, should not prevent investigators from going into subjects with great care, so as to determine their exact value.

LITERARY NOTE.

In the *Revue des Deux Mondes*, of December 15th, Dr. Dupré has an essay on the insanity of Charles VI. of France, which has all the good points with which the writings of Cabanès, Nass, Witkowski and other French medico-historical authors have made us familiar. By good points we mean the minute analysis, according to the teachings of modern medical science, of diseases rightly or wrongly imputed to figures in history, and exceptional powers of insight by which obscurities, long since accepted as facts, are brought into the light of day. That there were traces of mental weakness among Charles VI.'s ancestors is a matter

of no small moment to the essayist. Jeanne of Bourbon, mother of the king, was at one time, mentally unbalanced; his grandfather died of apoplexy; and his uncle was a melancholic. Moreover, consanguineous marriages were of frequent occurrence among the descendants of St. Louis. Even during his adolescence, the king's life was characterized by debauchery, a habit of living that was never forsaken; and what with his fatigues, his depressions, the picture presented by Dr. Dupré does not indicate that physical development was rigorously pursued, though historians would have us believe the opposite on account of the famous endurance ride in the forest of Le Mans. The mendicant, who on that occasion, according to Froissart and Juvénal des Ursins, "more mad than sane, bareheaded, with naked feet clothed in a jerkin of white russet, rushed out from between the trees and boldly siezed the reins of the king's horse, exclaiming, 'King, ride no farther, but return, for thou art betrayed,' " is a pure figment and was the first hallucination with which the king was affected. The intermittent attacks of maniacal excitation during which the king recognized neither his wife nor children; the destruction of clothes and furniture and hangings; the periods of prostration following the delirious state; are dwelt upon by the writer to prove his contention that the derangement was a constitutional disequilibrium of the emotions and the volition; an intermittent psychosis with predominance of maniacal attacks; confusional crises of short duration in combination with the maniacal excitation. "When he (the king) ate," says Juvénal des Ursins, "he was a wolf, a glutton. As for making him undress or change his clothes, that was out of the question; hence, he was covered with lice and vermin and filth."

ORIGINAL ARTICLES.

ALTERATIONS OF THE CIRCULATION ON GOITRE.*

By C. C. GUTHRIE, M. D., and A. H. RYAN, M. D., of Pittsburgh.

Introduction.—The purpose of this communication is to record additional observations on the results following alterations of the circulation in goitrous thyroid glands,¹ and to further discuss these results in the light of other observations and considerations with a view of determining the factors concerned in their production.

Results.—Marked anatomical changes occur in enlarged or goitrous thyroid glands of dogs after alteration of the circulation. The greatest changes observed, occur when the circulation is reversed in the inferior thyroid vein by anastomosing this vein with the central end of the common carotid artery or by making the anastomosis of the artery with the peripheral end of the internal jugular vein below the point of origin of the inferior thyroid vein. The gross changes consist of a temporary swelling (Fig. 1) followed by a marked decrease in size of the lobe on the operated side. (Fig. 2.) The lobe feels much harder and denser. Microscopically, if the goitre be of the hyperplastic type, generally more normal staining colloid is seen after the operation; while if the goitre be of the colloid type, a decrease in the colloid substance is observed. (See Fig. 3.) In both cases the operated lobes in size, physical properties, and histological structure tend to revert to the normal.

The general behavior and metabolism of an animal subjected to such an operation also undergo striking changes. In dog No. 16, observations as to condition and studies in metabolism were made both before and after such circulatory alterations in the enlarged thyroid gland. A control dog was observed and studied over the same period, having been subjected to an operation on the same day that dog No. 16 was operated upon. The operation in the control dog consisted in interposing a preserved segment of vessel between the cut end of the common carotid artery, this requiring about the same length of time as the thyroid operation. The results are shown in the following protocol and table.

*From the Physiological and Pharmacological Laboratories of the University of Pittsburgh.

PROTOCOL I.

Dog No. 16.—Light yellow adult bitch. Presents large bilaterally symmetrical goitre. Animal very nervous and easily excited, thin in flesh and coat is harsh. Eyes very prominent, pulse rapid. Kept in roof kennel with daily access to open roof space for exercise from February 25th to April 24th, 1908. Little or no change in animal's condition during this period, or if anything the general symptoms are more pronounced.

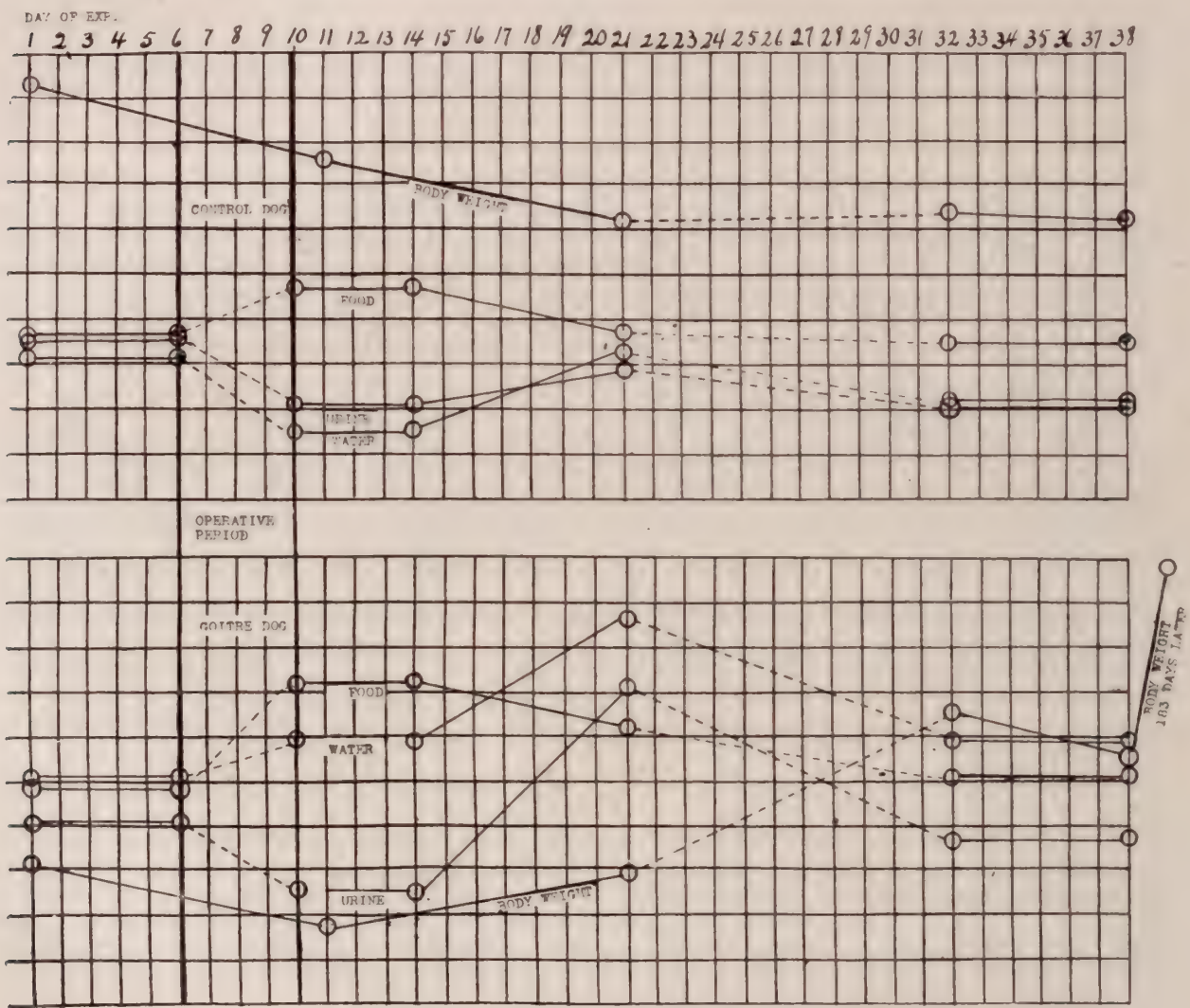


CHART I.

Curves as plotted from averages as shown in metabolism table.

Body weight: Two and one-half spaces equal one kilo.

Food: Three spaces equal 100 grams.

Water and urine: Two spaces equal 100 c.cm.

Since the chart is constructed from the table, the exact figures are readily obtainable.

April 24th, 1908, placed animal in metabolism cage. Weight at this time 6.3 K. (For metabolism results see Table and Chart I.) April 30th, 1908, photographed animal. Etherized, shaved neck and prepared for operation. Opened neck by incision in median line from lower level of cricoid cartilage to near manubrium of sternum and separated tissues down to anterior surface of trachea. Both thyroid lobes about same size, enlarged

and soft. Exposed and placed temporary clamp on right internal jugular vein below mouth of inferior thyroid vein. Ligated below this point and divided between the ligature and clamp and prepared the peripheral end for anastomosis. Exposed left common carotid artery and placed temporary clamp below and ligated above, central to the superior thyroid artery. Then divided between the ligature and clamp and prepared the central end for anastomosis, and united it to the peripheral end of the previously prepared jugular vein by end-to-end anastomosis. Removed clamps from the newly constructed vessel, thereby reversing the circulation in the peripheral portion of the right internal jugular vein and its branches. Ligated the main trunk of the vein just above the superior thyroid vein. Also ligated the left superior thyroid artery, thus decreasing the arterial blood supply of that lobe. The circulation in the

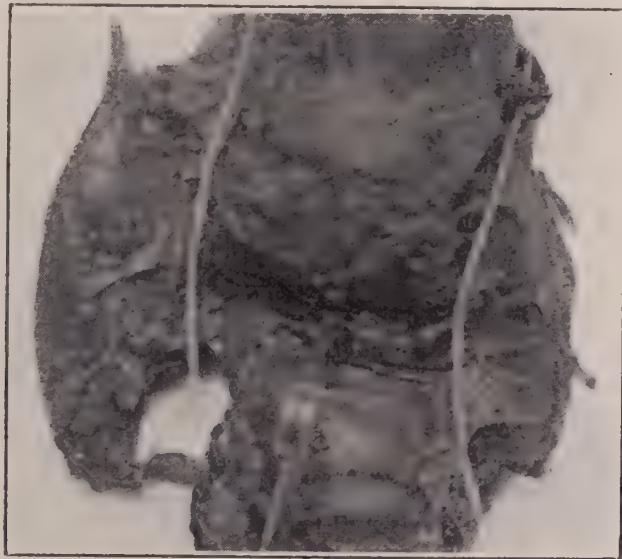


Fig. 1.

Showing enlargement after reversal of the circulation in the inferior thyroid vein to a normal thyroid lobe of a dog six days after operation. The operation was performed on the right side. (Cf. *Journal of the American Medical Association*, 1908, LI., 1658.)

right lobe of the thyroid at this time presents the appearance of enormous activity, the lobe rapidly swelling, the vessels seen on its surface standing out prominently and the whole mass being of an arterial hue and pulsating strongly. Evidences of edema rapidly appeared so that within a few minutes the lobe presented a greatly swollen and edematous appearance. Closed wound in neck. Swelling of right thyroid lobe still increasing. Applied large, soft dressing and placed animal in hospital. The animal speedily recovered from the anesthetic and appeared not to be in pain and but slightly inconvenienced by the operation.

May 1st, 1908. Morning. Swelling enormous but dog happy.

May 4th, 1908. Swelling much reduced. Bandage very loose. Wound dry. Placed animal in metabolism cage. Very lively and happy.

May 9th, 1908. Lobe decreased in size. Very tense, with strong systolic expansion. Left lobe soft.

May 12th, 1908. Pulse decreased. Right lobe apparently decreasing in size.

METABOLISM TABLE.

Day of Experiment	Control Dog			Dog 16		
	Food Gm.	Water CC	Urine CC	Food	Water	Urine
1 (April 24).....	114	30	...	204	40	248
2.....	125	160	262	90	70	122
3.....	146	175	230	159	359	212
4.....	156	247	122	171	363	138
5.....	177	196	219	230	340	234
6.....	...	112	198	...	350	258
Average	120	153	172	137	254	202
7 Operated upon both dogs.						
8.....						
9.....						
10.....	158	30	...	169	110	...
11.....	68	98	94	166	354	...
12.....	208	35	164	295	328	100
13.....	200	116	252	272	295	250
14.....	145	106	...	178	377	290
Average.....	156	77	102	216	293	128
15.....	116	185	232	337	295	210
16.....	112	160	258	83	310	356
17.....	176	190	98	378	330	176
18.....	200	145	150	166	700	532
19.....	150	154	...	150	514	534
20.....	95	225	132	200	432	420
21.....	...	110	156	...	460	274
Average	121	167	146	188	434	357
22.....						
23.....						
24.....						
25.....						
26.....						
27.....						
28.....						
29.....						
30.....						
31.....						
32.....	40	60	...	123	90	...
33.....	95	120	...	250	340	214
34.....	160	155	180	233	450	252
35.....	216	185	170	175	445	270
36.....	196	120	215	180	246	178
37.....	91	30	200	98	290	265
38.....	...	135	...	...	200	120
Average.....	114	115	109	151	274	186

The body weights were as follows:

Control Dog.		Operated Dog.	
April 24, 1908.....	8620 gms.	April 22, 1908.....	6300 gms.
May 5, 1908.....	8000 gms.	May 5, 1908.....	5750 gms.
May 15, 1908.....	7500 gms.	May 15, 1908.....	6200 gms.
May 26, 1908.....	7550 gms.	May 26, 1908.....	7650 gms.
June 1, 1908.....	7500 gms.	June 1, 1908.....	7300 gms.
		Dec. 1, 1908.....	8900 gms.

TABLE I.

Notes.—The food consisted of cooked hotel meat scraps, gravy, bread and potatoes. Type of metabolism cage used has previously been described. (*The Archives of Internal Medicine*, 1910, V., 234.)

May 21st, 1908. Operated lobe about one-third size of unoperated, and very dense (Fig. 4). Unoperated lobe soft. The animal had been in splendid health and spirits since recovery from the operation, in fact, much less nervous and excitable. Nervous symptoms completely disappeared. Hair is being shed very rapidly (Fig. 5).

November 30th, 1908. Killed by other dogs. Neck chewed and thyroid pierced.

Post-mortem examination: Very large thymus gland. The operated thyroid lobe measured 5x2.5x2 cm.; the unoperated thyroid lobe measured 8x4.5x3 cm. The right lobe was very dense and markedly bilobed, due to a transverse constriction which is a little nearer anterior than the posterior end. Posterior division of right lobe slightly denser than anterior portion. Removed specimen from both divisions and preserved in 10 per cent. formalin in 0.9 per cent. Na Cl. Both lobes gave small quantity of clear, viscid fluid on sectioning, but the right lobe least. Left lobe very soft. Anterior half contains cavities that easily admit the index finger, which are full of bloody fluid. Posterior half much denser than anterior, but *much* more flabby than *operated* lobe. Preserved specimens from both anterior and posterior divisions. All specimens were removed from postero-lateral surfaces of lobe; and one from the anterior end of the left lobe being more from the anterior surface from edge of wound. Posterior end of lobe contained some clearish fluid.

Removed gross specimen from neck, photographed (Fig. 6) and preserved in Kaiserling. Weight of dog 8900 gm. Animal in fine condition.

Microscopical Examination.—The results are shown in Fig. 7, from which it is seen that the structure of the right lobe was the more nearly normal.

Summary.—When the circulation is reversed in the veins of an enlarged thyroid lobe the ultimate result is a decrease in the size of the gland. In histological structure it returns toward the normal. When general symptoms are present, these tend to disappear.

Similar results on size and structure follow simple ligation of the thyroid veins of an enlarged thyroid gland, but the changes are of less degree.

PROTOCOL II.

January 27th, 1909. Ligation of thyroid veins of normal gland.
Dog 33. Black and white adult female dog, weight 6 K.

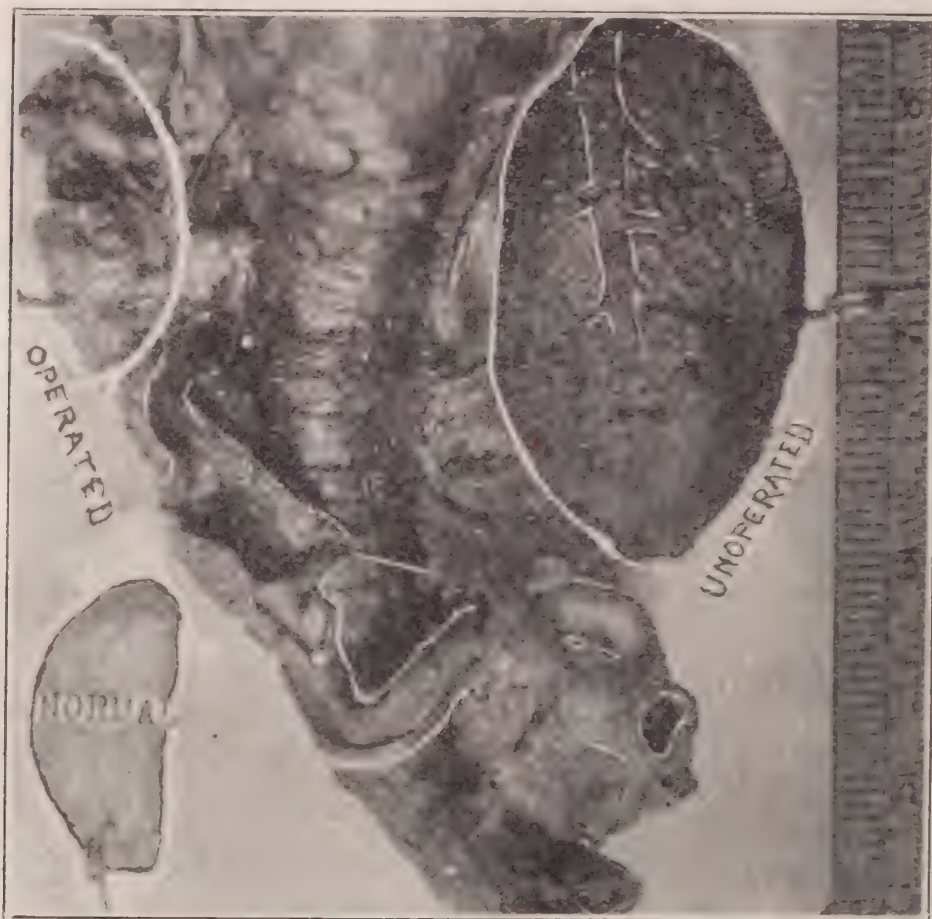


Fig. 2.

Showing the results of reversal of the circulation in the right internal jugular vein upon the right lobe of the thyroid after six and one-half months. At the time of operation, the thyroid lobes were greatly and symmetrically enlarged. The central end of the left common carotid artery was anastomosed to the peripheral end of the right internal jugular vein, both vessels being ligated and divided for the purpose.

Before operation, the dog in addition to presenting the very large symmetrical goitre, was very fat and the coat harsh and much of the hair on the back had been lost. Immediately after the operation the right lobe became greatly enlarged and edematous and showed marked systolic expansion. From this stage the gland rapidly diminished in size and became dense to the touch. Also the general symptoms improved and the coat as well. Gland marked "Normal" was taken from a normal dog of the same size for comparison. (Cf. *Journal of the American Medical Association*, 1908, LI., 1658.)

January 30th, 4:12 p. m. Operation commenced. No difference in size of the thyroid lobes; gland apparently normal.

January 30th, 4:15 p. m. Ligated internal jugular vein on the right side, below the origin of the inferior thyroid vein.

4:23 p. m. Operation finished.

January 29th, 5 p. m. The lobe on the right side is enlarged, being the size of a small walnut. The lobe on the left side is smaller than that on the right side.

January 30th, 2 p. m. The gland is the same as when last observed.

January 31st, 12 m. No change in the gland.

February 2nd, 2 p. m. The swelling has disappeared on the right side.

February 3rd, 1:30 p. m. The right lobe is smaller than the original size (apparently), and is rather firm; the left lobe is slightly larger than



Fig. 3.

Micro-photograph of the thyroid lobe of a dog six and one-half months after operation. The right side of the picture shows the structure of a bit of the goitrous thyroid tissue from the left lobe. The left side of the picture shows the structure of a bit of tissue removed from the right lobe on which side the circulation was reversed in the internal jugular vein. (See Fig. 2.)

the right, seemingly slightly larger than before operation, and a trifle softer.

March 27th. Animal injured in a fight.

March 31st. Animal in excellent condition, except for injuries. Chloroformed and exposed thyroid gland. The right lobe (operated) is about one-fifth smaller than the left (unoperated).

PROTOCOL III.

April 16th, 1909. Ligation of thyroid veins and superior thyroid artery.

Dog 35. White bull terrier, male.

2:26 p. m. Operation commenced. Both thyroid lobes the same size; the gland appears to be very slightly enlarged.

2:30 p. m. Tied the main trunk of the inferior thyroid vein below the lobe on the right side. Separated the gland from its surrounding tissue.

2:34 p. m. The blood in the artery on the right side assumed a venous hue. Tied the superior thyroid artery on the left side, which lay alongside of the lobe.



Fig. 4.

Dog 16. Showing condition of goitre about three weeks after operation. Note the small size of the lobe on the side of the arterio-venous anastomosis (the right) as compared to the lobe on the side of arterial ligation (the left).

2:36 p. m. The right lobe is becoming edematous. Tied main branch of the superior thyroid vein on the right side.

2:38 p. m. The right lobe is somewhat larger than the left.

2:42 p. m. Wound closed and operation completed.

April 18th, 2 p. m. Slight swelling in mid-line under lower jaw.

April 21st, 3:30 p. m. No swelling. Dressed wound.

April 24th. Wound dry and healing nicely.

There is a primary swelling and this may be followed by final decrease in the size of the operated lobe of the gland. Gross anatomical changes in a normal gland following reversal of the circulation in the inferior

thyroid vein are similar for at least six days after the operation though less extensive (Fig. 1). Great variations in the results occur following ligation of the thyroid veins which we believe is due to the great variation in their anastomotic connections. (See Fig. 8.)

In a case where one lobe of the thyroid gland was removed and replaced with reversal of the circulation extensive changes occurred.³ After a temporary swelling the operated lobe became smaller and more fibrous. The unoperated lobe presented the appearance of a colloidal goitre. New factors are introduced here since there was temporary anemia, perfusion with sodium chloride solution and severance of



Fig. 5.

Dog 16. April 30, 1908. Anastomosed central end of left common carotid artery to peripheral end of right internal jugular vein. Tied right internal jugular vein distal to superior thyroid vein, and ligated left superior thyroid artery. Dog killed by fighting November 30, 1908. Photograph shows condition about three weeks after operation on goitre. Note condition and shedding of coat.

nerves.² Ligation of the superior thyroid artery has not given like ultimate results. (See Protocol I. and Figs., Dog 16 and Protocol III.) In another case the arterial supply to one lobe of the gland was decreased by anastomosing the peripheral end of the common carotid artery to the central end of the internal jugular vein, the anastomosis being made below the origin of the superior thyroid artery. This decreased the blood flowing through the superior thyroid artery. On September 26th, 1910, five

years after the operation, the two lobes were compared and the specimens taken. The gland on the operated side was smaller, being 1.5 cm. x 3.0 cm. as compared to 1.5 cm. x 4.5 cm., the size of the unoperated lobe.

Summary:—In general, after reversal of the circulation in the thyroid veins by arterio-venous anastomosis; or after ligation of the veins of one lobe of a goitrous gland, there has been evinced a tendency of the operated lobe to return toward the normal structurally. Also with this, there may occur an alteration in the metabolism of the animal while the general behavior changes toward the normal (the latter being determined by direct observation).



Fig. 6.

Dog 16. April 30, 1908. Anastomosed peripheral end of right internal jugular vein to central end of left common carotid artery. Tied left superior thyroid artery. November 30, 1908, took specimen. Shows relative size of the two thyroid lobes. The serrations in the sides of the lobes resulted from the removal of bits of tissue for histological examination.

DISCUSSION.

From the above results it is clear that such circulatory changes may result in great alteration in the size and structure of the thyroid gland and also in the general condition of the animal. The explanation of these results is not a simple matter. Changes in the size and structure of the thyroid gland have been produced by other means. So it is of interest to mention certain of the results and views of other investigations, in that

they aid in interpreting the results following alterations in the circulation as above reported.

It is obvious at the outset that if there are common factors concerned in all of the various methods of producing changes in the size and structure of the thyroid gland they are more or less obscure, for such changes can be produced in widely differing ways. Under physiological conditions the thyroid gland may become enlarged as at puberty or during pregnancy, and it may become decreased in size in old age. Whether

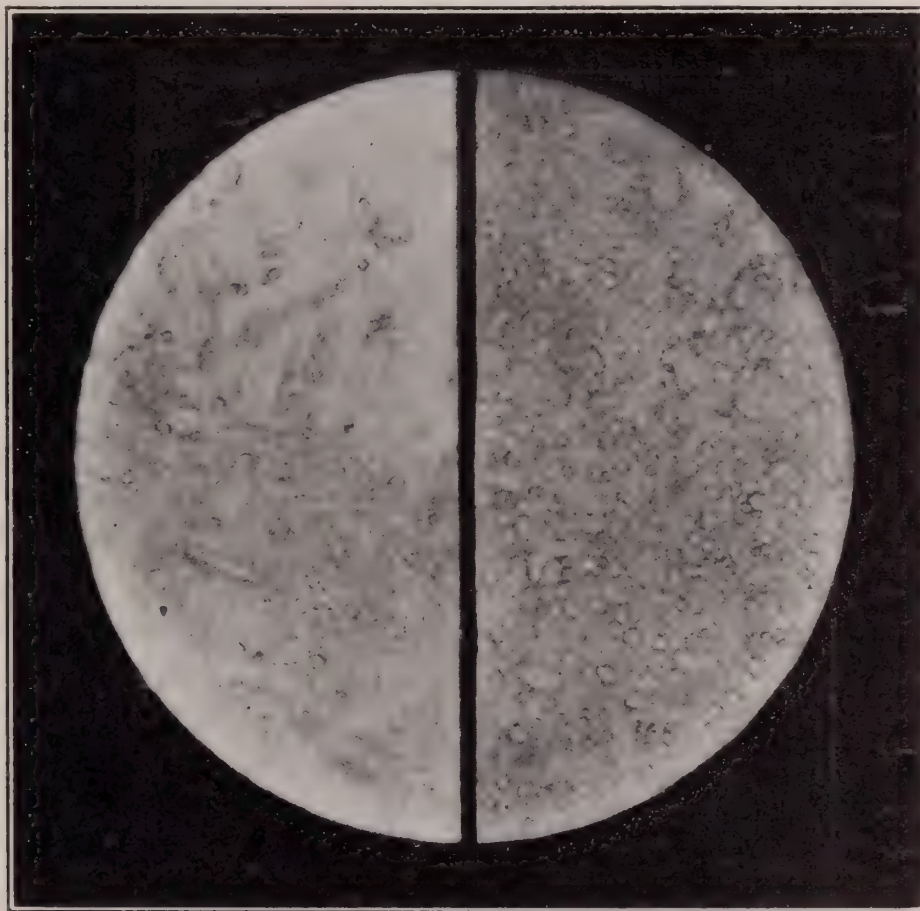


Fig. 7.

Micro-photograph (retouched) of the thyroid lobe of dog No. 16, seven months after operation. The right side of the picture (to the reader's left) shows the structure of a bit of the goitrous thyroid tissue from the left lobe to which the arteries were tied. The left side of the picture shows the structure of a bit of tissue removed from the right lobe on which side the circulation was reversed in the inferior thyroid vein. Both specimens were taken from the posterior poles of the lobes.

these changes are associated with a disproportion between supply and demand of the thyroid secretion is as yet unknown.

Enormous enlargements of the thyroid may occur without any untoward symptoms of a clinical character, while smaller goitres may be associated with the gravest general disturbance. Many attempts have been made to classify these conditions, but as yet none such has been satisfactory from all standpoints. Microscopical structure has been taken as the basis for such a classification. Accordingly glands of the normal,

hyperplastic and colloid type with varying combinations of colloidosis and hyperplasia have been recognized. But when applied to the symptomatic classification, entirely healthy individuals may present colloid glands and myxedematous individuals or cretins may present glands of similar microscopical structure. Again, symptoms of a nervous character may be associated with very slight degrees of hyperplasia of the glands, not greater than that found in individuals symptomatically normal. Indeed, in one and the same gland can be found areas of normal, colloidal, or hyperplastic structure.



Fig. 8.

Diagrammatic drawing showing veins of the neck of the dog with free venous anastomosis of thyroid veins, and also the vessels ligated at the operation. Though the conditions shown were observed several months after ligation of the superior and inferior thyroid veins, only a slight decrease, if any, in the size of this thyroid lobe occurred. The slowness of the change is ascribed to the free venous anastomosis.

Extensive chemical analyses, while seeming to show a relation between percentage composition of iodine and microscopical structure of the gland, have not been shown to bear such relation to the clinical conditions. While in general the symptoms of exophthalmic goitre are associated with a hyperplastic condition of the thyroid gland, and the symptoms of myxedema are more generally associated with anatomical deficiency, their association is not sufficiently constant to establish causal relations between structure and symptoms.

The relation of gland weight to body weight is equally unsatisfactory as a basis of classification. The condition of the thyroid gland as regards size and structure may therefore only be regarded as a symptom of the more or less general disturbances called exophthalmic goitre, myxedema, and cretinism, and as being by no means pathognomonic.

Perhaps before reaching such a conclusion, the question of the internal secretion should have been considered in the light of present knowledge of the thyroid gland in its relation to the organism as a whole. Hypo- and hypersecretion have been ascribed as causes of the conditions called exophthalmic goitre, myxedema and cretinism. That the thyroids have internal secretions necessary to the normal activity of the organisms possessing them is concluded from observations too well known to need mention. Such a far-reaching conclusion without modifications is unwarranted. The universal occurrence of the thyroid structure in all vertebrates, certain of the results reported following extirpation of the thyroid gland, *i. e.*, myxedema and death, and the improvement of cretinoid individuals with atrophic glandular condition when fed with preparations of the thyroid gland are ordinarily quoted as indicating such an internal secretion. The universal occurrence of this structure is not reason *a priori* that this gland is essential to life. For the occurrence of certain appendages (ears) are equally widespread and obviously not in this sense essential to life. In man, total removal of the thyroid was practiced by Swiss surgeons who record "operative myxedema" in only a certain number of such cases. With monkeys Horsley, and Murray and Edmunds, have stated that they were able to induce myxedema. But Vincent was unable to obtain such results. Rats and guinea-pigs, according to Vincent, do not seem to suffer at all from removal of both the thyroids and parathyroid glands; cats and dogs frequently suffer and die, but not invariably; while in foxes, death comes on comparatively early. Schiff in 1856 and later in 1884 reports death following total extirpation of the thyroid and parathyroid gland in dogs; while in foxes, which were apparently the most prone to exhibit ill effects after thyro-parathyroidectomy, Carlson and Woelfel have removed these glands with by no means such dire results. In one experiment the fox so operated was normal one and one-half months after the operation, at which time it was killed. Post-mortem examination revealed no thyroid or parathyroid tissue, although thirteen suspected glandules were sectioned and examined. In agreement with others thus far in our own observations on chickens and pigeons, total extirpation has not induced a fatal ending. Lanz reports slower development and depressed laying power in a thyroidectomized hen. In no animal, including monkeys, was Vincent able to induce symptoms of myxedema.

In view of such results, the subject presents many difficulties in the way of its solution. While the absence of untoward symptoms following total extirpation is not proof that the gland does not normally functionate

beneficially to the animal, it is unwarrantable to conclude that such a function is absolutely indispensable to life, or even a comfortable state of health. Unfortunately broad generalizations have been made from specific experiments.

These considerations are of value when we consider, as previously mentioned, the theories based on thyroid secretion of exophthalmic goitre, myxedema and cretinism. The current general conception has been that the symptoms of exophthalmic goitre were due to a hypersecretion of the thyroid gland. This is based on the fact that excessive thyroid administration may produce nervous and circulatory symptoms similar to those of exophthalmic goitre. Removal of portions of the gland, however, has failed to permanently improve or cure such conditions. Moreover, the nervous and circulatory disturbances following excessive thyroid administration are not the entire picture for metabolic changes are also induced by such procedure.

As opposed to the view of hypersecretion, are the reported results of improvement of the symptoms of exophthalmic goitre and return of the gland structure toward normal, after feeding thyroid gland to such patients. It is believed by Marine and Lenhart that "glandular hyperplasia as a physiological reaction is due to a deficiency," and that in exophthalmic goitre there is physiologically a hyposecretion of the thyroid gland. The hyperplasia of the gland found in such cases is supposed to be a compensatory hypertrophy. With this view would accord the result of Halsted on dogs and Hunt on guinea-pigs, who reported congenital hypertrophy of the thyroid glands in the offspring of thyroidectomized mothers. Edmund's results only doubtfully confirm those of Halsted, while the results of Lanz on dogs and goats are contradictory.⁴ The large percentage of goitres in dogs, the etiology of which is obscure, makes it hard to ascribe specific causes to the results of congenital hypertrophy as above reported, especially in the presence of contradictory results.

Based on such observations, Hoskins⁴ studied the congenital effect of hyperthyroidism by feeding pregnant guinea pigs with thyroid gland. While there was an average depression of 56 per cent. in the gland weight to body ratio, the maximum ratio of gland to body weight is the same for the experimental and control animals. The structures of the normal and experimental glands were the same. The bearing of these observations on experimental "congenital hyperthyroidism" are necessarily obscure. It is of interest to mention the observations of this investigator upon the thymus in such animals. He reports an average hypertrophy of 38 per cent. of the thymus gland under the conditions of his experiments. We have not made extended observations upon this gland in connection with alterations of the circulation, but in dog No. 16 we noted a large thymus gland at post-mortem. (See Protocol I.)

To return to the theory of hyposecretion as an explanation of the

symptoms of exophthalmic goitre, no such symptoms may follow total extirpation of the gland in a patient previously free from these symptoms. Similarly myxedema cannot be unqualifiedly ascribed to hyposecretion, for although myxedema has followed extirpation of the thyroid gland, this is not always the case. No such quantitative theory of secretion will harmonize the evidence presented. And as Carlson and Woelfel have expressed it "the etiology and symptoms complex of exophthalmic goitre in man is too complex for any one theory so far advanced."⁵ It should be borne in mind that many of the statements found in the literature were based upon experimental operations performed before the days of aseptic surgery and that many of those performed at the present day upon animals are done under conditions which would be considered criminal, from a bacteriological and surgical standpoint, if applied in human surgery. This recalls to mind the variability of surgical results before days of modern methods.

In view of the indefinite state of present knowledge of the activities of the thyroid gland, it is not surprising that little is known of the mechanism of its action, and it would, therefore, be out of place to enter here into a lengthy discussion of this phase of the subject. But as we are considering conditions which may alter the structure of the thyroid gland with the hope of correlating such changes with those we are herein reporting following alteration of the circulation; and as the administration of thyroid substance and iodine compounds are reported to induce changes in the gland, some of the results bearing on the question of internal secretion will be presented.

For years before the discovery of iodine, certain sea animals and plants containing iodine were used medicinally in cases of goitre. Long ago it was observed that the size of goitrous thyroid glands were sometimes reduced by the administration of preparations of iodine. Similar results were reported following administration of the thyroid gland, as also following administration of iodothyron. These results led to the view that iodothyron was the active principle of the internal secretion of the thyroid gland. At present the trend of opinion seems to be that the colloid contains the active internal secretion and, quoting Marine and Williams, "that the physiologic activity of the (colloid) thyroglobulin is dependent upon the amount of iodine contained in organic combinations."⁶ The view that iodothyron was the active principle of the internal secretion was based on results showing the absence of symptoms following thyroidectomy when iodothyron was administered. Some investigators were unable to confirm these results. But E. Wormser reports that he could prevent the attacks of tetany and preserve the life of the animal for a long time by administering the whole gland. The contradictory nature of the results following thyroidectomy as previously discussed, render conclusions impossible from the above work. The exact relation of iodine to the activity of the normal gland is not unquestionably established. The question of

iodine relation to structure of pathological thyroid glands has been extensively investigated by Marine and Williams,⁷ who in the summary of their results state that the iodine content varies inversely with the degree of hyperplasia. They think that the internal secretory value of the colloid varies directly with its richness in iodine. Then in terms of iodine deficiency it would seem that the condition of exophthalmic goitre would be one with the greatest deficiency of iodine per unit of gland tissue. It is interesting to note, however, that in both colloidal and hyperplastic types of goitre, the total iodine or the ratio of iodine to body weight is usually greatly increased, while normal glands have been examined that showed at most only a trace.

As regards the changes in the gland and general symptoms following the administration of thyroid gland or iodine compounds in goitrous conditions the results by no means indicate that the cause is primarily a change brought about in the nature of the internal secretion of the gland itself. It is true that the iodine content of the gland may increase along with changes in the structure and general symptoms, but to ascribe to the secretions the primary cause of the change would be no more warranted than ascribing the beneficial effects of iodoform to a wound when locally applied, to altered thyroid secretion. For the local application of iodoform in such conditions may increase the iodine content of the thyroid gland.

On the hypothesis that the internal secretion of the thyroid gland was to be found in part, at least, in the lymph, Carlson and Woelfel⁸ made studies upon the lymph of animals hoping to detect the thyroid secretion. Assuming that the active principle of the internal secretion was the iodine containing compound they analyzed goitre lymph for iodine, but were unable to detect it. They then made use of the aceto-nitrile test of Hunt, who showed that the resistance of mice to aceto-nitrile was increased by thyroid feeding, while the resistance of rats was lowered. Of course, it must be first shown that the substance or substances in the thyroid gland responsible for the tolerance to aceto-nitrile are identical with the internal secretion. Hunt has shown that other compounds of iodine may likewise increase the tolerance of mice to aceto-nitrile. Also, though to a lesser degree, extracts of other organs give similar results. However, the aceto-nitrile test gave negative results when applied to the goitre lymph by Carlson and Woelfel. Neither iodine nor microscopical structure, according to Carlson and Woelfel, afford an adequate basis for classification of thyroid disturbance in man. For they say, "if the histological structure and iodine content of the thyroid are true indices of the physiological states of the gland, and these are casually, directly or indirectly, related to the symptoms of cretinism, myxedema, and exophthalmic goitre, we ought to find these symptoms in goitrous dogs" since the same parallelism exists between structure and iodine content as in man. But such symptoms are at least rare.

By way of summary it may be said that we do not know the nature of the internal secretion of the thyroid gland. Furthermore, we are unable to explain the change occurring in the thyroid gland following administrations of thyroid preparations or iodine compounds. And subsequently are unable to apply such results to an interpretation of the changes following alteration of the circulation.

There are indications that the relations of the thyroid gland are very broad so, possibly, we should not look to the gland alone for an interpretation of the changes produced. Although the thyroid and parathyroid glands are by many considered as distinct, the observations of Vincent and Jolly and others show that the parathyroid may be transformed into typical thyroid tissue (as regards structure) after extirpation of the thyroid, and many examples of follicular structure and colloid in the parathyroid glands are cited. The statements that tetany and death result when the parathyroids are removed would seem to speak against the entire assumption of parathyroid function by the thyroid gland after parathyroidectomy. The statements regarding parathyroidectomy are even more confusing than those regarding thyroidectomy alone. Some experimenters have claimed to observe death as a result of parathyroidectomy, while others report the non-occurrence of such results. The problem is even more perplexing because of the minuteness of the quantities of parathyroid tissue which have been reported to have warded off the usual consequences of parathyroid extirpation. To sum up the results of parathyroidectomy, in the hands of some observers tetany and death have ensued in rapid succession after this operation. Other investigators have removed the parathyroids without the invariable occurrence of such symptoms; recovery in certain cases being complete. It has been stated by some of those who have obtained tetany and fatal results as a consequence of parathyroidectomy that such results might be prevented by calcium administration or transplantation of parathyroid tissue. Others have questioned the interpretation of the results obtained after calcium administration in such cases claiming that the symptoms of tetany were intermittent in character and that they frequently stopped in an unaccountable manner and recovery followed. Of interest in this connection are the observations of Thompson, Leighton and Swarts that *operation alone* on the tibia markedly influenced the tetany parathyropriva even after the dog had developed severe symptoms. From the above it is clear that the relations of thyroid and parathyroid to each other and to the organism as a whole are as yet not established.

Another indication of the broader relations of the thyroid gland is indicated by the results of Carlson and Jacobson who found the ammonia content of the blood to be increased in cats and foxes after complete thyroidectomy, together with depression of the ammonia destroying power of the liver.

Other indications are not rare of such broader relations of the thyroid

structure. The reported hypertrophy of the hypophysis after thyroidectomy, as also in many diseases of the thyroid and the changes in the hypophysis in certain constitutional conditions; the retarding action of thyroid preparations upon the carbohydrate destroying mechanism of the body; the reduction of the tendency toward ether and adrenalin glycosuria after thyroidectomy; the observations that 86 per cent. of the myxedematous subjects are females; and the reported anomalies in the development of chicks hatched from eggs laid by thyroidectomized hens, indicate that there may be relations of the thyroid which are as yet unsuspected.

From the foregoing it is seen that little is to be obtained from the enormous literature on thyroid which will help in interpreting the results obtained by alteration of the circulation in goitre. An hypothesis ascribing such changes to a primary alteration of the secretion of the gland, would be hard to construct on the basis of the facts at hand.

In considering the results following alterations of the circulation from the standpoint of glandular changes following such procedures, it is not implied that the primary glandular changes are initiating causes of the general results observed. While it is possible that the primary changes produced by reversal of the circulation in some of the veins of the thyroid gland, as was done in dog No. 16 (p. 168), are responsible for alterations in the general metabolism and the general improvement observed, such a conclusion is by no means warranted. But to entertain for a moment the hypothesis that it is responsible for the change produced, we might consider that the symptoms of nervousness and metabolic disturbances observed before the operation in this dog were due, say, to a hyposecretion of the thyroid. Not that the thyroid gland was giving off a less amount of internal secretion than normally secreted by the gland, but that there was a state of hyposecretion in the sense that the demands for this secretion were greater than normal. Reversal of the circulation might then be considered as meeting the demands by augmenting the amount of acting thyroid secretion per unit of time and in this way temporarily correcting the deficiency, the immediate results instituting a permanent beneficial change.

The metabolic changes and changes observed in the general condition of this dog are interesting, whatever be their cause. For a parallelism seemed to exist in this animal between glandular changes and the clinical symptoms which were of the character of exophthalmic symptoms frequently observed in man, but very rarely in dogs. Other hypotheses could be advanced, but we merely cite one as indicating the possible broad changes which could be conceived as resulting from circulatory alteration.

Turning to the local causes of the structural changes occurring in the gland itself after circulatory alteration, we will consider them from intra- and extravascular standpoints. The intravascular changes including such phases as anemia, hyperemia, functional activity as related

to blood supply, capillary pressure, rate of flow; and the extravascular changes comprising edema, tissue respiration, and survival and functional activity under altered extravascular conditions.

INTRAVASCULAR CONSIDERATIONS.

The circulatory alterations which we have produced in goitre have brought about, so far as immediate results are concerned, three distinct conditions. Namely, partial anemia alone, as when the artery to a gland is ligated or when the blood pressure in the parent artery (carotid) is reduced by anastomosing the peripheral end of this vessel to the central end of the internal jugular vein; partial anemia with congestion, when the thyroid vein or veins are ligated; and hyperemia with reversal of the circulation when an arterio-venous anastomosis is made with the inferior thyroid vein or parent vessel. Anæmia then occurs in the first two conditions but not in the last. Partial asphyxiation of the tissue elements as a consequence of anemia, is therefore an early factor in the production of the noted changes. Asphyxiation is also very probably a factor in the production of the changes noted after arterio-venous anastomoses. But it is probably more largely due in this case to the extravascular changes, such as edema, which will be discussed presently. We have defined anemia from the standpoint of physiological blood supply, which is considered to be an adequate blood supply for the functional state of the tissue. The factors concerned are quantity of blood to unit mass of tissue, per unit of time, and the state of tissue demands. While occlusion of the veins would produce a congestion and in the pathological sense a passive hyperemia, there would be a partial anemia in the sense that the arterIALIZED blood supply per unit of tissue per unit of the time would be reduced. Also there might follow an increased tissue demand through asphyxial stimulation.

The exact immediate conditions produced in the tissues by such procedure as ligation of vessels, or the effects of rapid severe edema are little understood. While the degree of anemia produced would on the whole vary directly with the degree of circulatory obstruction, transient conditions might occur in the smaller vessels producing varying anemic and asphyxial states not indicated by the primary circulatory obstruction. For example, the partial anemia induced by the vascular ligation might, by the stimulating action of asphyxia upon the arterioles and even the capillaries, cause a greater degree of anemia by the contraction of these vessels. This would introduce the question of the relative resistance of tissue elements to the adverse conditions of asphyxia as also the ultimate survival of tissues, under the varying degrees of anemia that might be produced. But this is considered below.

In considering the results following simple ligations of the superior thyroid artery, as was done on dog No. 16, herein reported, from the standpoint of anemia it is first necessary to know the relation of blood

supply to demand. Since we have used partial asphyxia to explain the results following circulatory alterations, and since partial anemia might be inferred to have occurred in the left lobe of the gland of dog No. 16 as a result of ligation of the superior thyroid artery, the question arises, why no such diminution of the size and change in character of structure occurred in this lobe, as has occurred following ligation of the thyroid veins. A notorious fact is that the blood supply to goitrous thyroid glands is greatly increased. And as the minimum quantity of blood supply which would suffice to maintain a continued state of the goitrous activity is not known; the degree to which the blood supply could be diminished without producing glandular changes is not known. So when the artery is ligated it is impossible to say whether a partial anemia is produced. For we are ignorant of one of the factors. Where the vein or veins are ligated the condition is not the same for the factor of edema and its dependent results is introduced. Furthermore, the ligation of the superior thyroid artery may not have produced a sufficient degree of asphyxiation to lead to the production of a sufficient quantity of disintegrative products necessary to induce the inflammatory changes accountable for the glandular reaction, as elsewhere discussed; or in the absence of edema (present when the veins are ligated) such disintegrative products if formed may be too rapidly removed to bring about this inflammatory reaction, neither the lymphatic nor venous channels being interfered with.

The condition of partial anemia may be further augmented by the partial occlusion of the capillaries as a result of increased extravascular pressure produced by the edematous condition. The factor of anemia is probably of importance in the extravascular processes which it inaugurates either directly by producing anemia of the tissue cells; or indirectly through injury to the vessels themselves rendering them more permeable and thereby augmenting the onset of the edematous state, the effect of edema being the same as that produced by anemia, *i. e.*, asphyxia.

In a goitrous gland already hyperplastic, the beneficial results to be derived from the production of an active hyperemia might be doubted. Based upon the results obtained by severing the vasomotor nerves to a part, and thus increasing its blood supply it might be anticipated that the production of an active hyperemia would give rise to a further hyperplasia. But it is easy to thus fall into error. For example, if the vasomotor nerves to a part be cut, the vascular channels will dilate and a greater quantity of blood will flow through the part. Greater growth has been observed under such conditions. But although the existence of specific trophic nerve influences is doubtful, if not disproven, it is still possible to object to these results as being due directly to the increased circulation as it might be due to some change set up in the tissues themselves by cutting the nerves. For when such nerves are sectioned, fibres other than vasomotor fibres are severed.

Assuming that no such nervous trophic influences are concerned in the phenomena, it by no means follows that the result is due to a better nutrition of the part from the presence of a greater circulation. That is, one cannot conclude that the growth of a tissue may be augmented by merely supplying it more abundantly with blood. For in meeting conditions necessary to accomplish this, an abnormal state of the capillary circulation is inevitable. And it is possible that this in itself acting either directly, as by pressure upon the tissue elements; or indirectly, through changes taking place within the capillaries themselves resulting in an alteration of the normal function, might result in stimulating the tissues to greater activity. For example, such a hyperemic state is usually if not always accompanied by an increased pressure within the capillaries. This condition might favor the passage of substances used by the tissues out of the blood more than it would favor the entrance into the blood of waste products from the tissues. Thus the accumulation of waste products might serve as a stimulus to the tissues; and an abundance of food materials being supplied at the same time, it is conceivable that hypertrophy might result.

Again it might be urged that owing to the greater amount of blood flowing through the part, the temperature of the part would be increased. And owing to the increase in temperature the tissues might manifest a greater activity. That this last view may be the key to the explanation is indicated by the fact that some of the best observations of this character have been made upon external structures, such as rabbits' ears and cocks' combs where the actual increase in temperature may be considerable. For if such an experiment be performed upon the ear of a rabbit, a very marked difference in the temperature of the two ears will be observed even by feeling with the hand.

But reversal of the circulation in the veins of the thyroid gland does more than increase the flow of the blood. So while hyperemia is a factor in the production of the end results it acts indirectly. When the central end of an artery is anastomosed to the peripheral end of a vein the result is that in the venous portion of the vessel, the direction of the circulation is the reverse of the normal; the pressure is higher; and the blood is arterial. The pressure in the capillary area normally drained by the vein will be increased. For not only has the vein ceased to transport venous blood away from the capillaries, but it has engaged in conveying arterial blood to them. So the capillary pressure is raised not only by the damming back of the blood by the vein having ceased to convey venous blood (passive anemia); but by the vein leading more blood into the part, the pressure in the capillaries is further augmented. Some of the blood sent back through the vein no doubt may reach unobstructed venous trunks through direct anastomotic connections. And these quickly respond to the new conditions and rapidly enlarge to accommodate more blood in passing to veins returning to the heart. So the greatest increase

in capillary pressure due to the reversal of the direction of the circulation in the vein would be observed shortly after the operation. And experimental observation bears this out. For when the central end of one common carotid artery is anastomosed with the peripheral end of the inferior thyroid vein on the opposite side of the neck, the effect upon the circulation in the gland is immediate and striking. This is observed particularly if the gland present the condition of well marked goitre, that is, if it be markedly enlarged and the blood vessels prominent. (See Protocol of Dog 16.) On occluding the vein preparatory to division and anastomosis with the artery, the gland may swell somewhat and become purplish; that is, present the appearance of passive anemia or engorgement with venous blood. But very quickly after the new circulation is established, it not only becomes greatly enlarged in size and the blood vessels become more engorged, but very red or arterial in hue. The possible increased rate of flow through the capillaries may interfere with the metabolism of the cells which derive their nutrition directly from the blood stream, *i. e.*, the intimal cells of the blood vessels; or the increased capillary pressure may in some way interfere with the normal metabolism of the capillary endothelium or may mechanically injure this structure. At any rate evidence is shown that the normal properties of the capillaries are affected by the passage of liquid from the blood through their walls into the surrounding tissues, producing the phenomena of edema.

EXTRAVASCULAR CONSIDERATIONS.

As to the interpretation of the changes which affect the extravascular tissues, they are in part explainable from the changes within and affecting the blood vessels and also in part to the extravascular conditions established as a result of the circulatory derangements. It is impossible with our present knowledge to enumerate in detail all of the factors involved. But it is nevertheless interesting to consider certain factors which undoubtedly play a rôle in the production of the extravascular phenomena. Thus as a result of the increased capillary pressure the tissues become edematous. That is, they become infiltrated with liquid. The flow of this liquid being chiefly in one direction, namely, to the tissues, the conditions for return of tissue metabolic products are unfavorable. This would lead to an abnormal concentration of such substances in the tissues. Since it is known that the functional activities of tissues are harmfully affected even to the point of extinction of vitality in this way, we have a theoretical explanation for the interpretation of the changes observed. Also the same condition results in an increase in the extravascular pressure upon the tissues and this, too, in all likelihood may affect the activities of the tissues in the same direction. Reducing the interpretation to terms of respiration in order to simplify the conception, these conditions would result in an asphyxial state in the tissues. And in line with what is known regarding the relative susceptibility and resistance of tissues to

such an adverse condition, we have a rational explanation of the tendency of the tissue elements to later present more normal morphological characteristics. That is, it may be assumed that the abnormal tissue elements are less resistant to the adverse condition than are those which are more nearly normal. Therefore, the more nearly normal elements would from this standpoint be expected to better survive the adverse condition.

Bearing directly upon this point is a consideration of the nature of the abnormal tissue elements. For if it is assumed that the abnormality is developed in cells arising primarily as normal thyroid tissue elements, and this seems the most rational conception, then it would seem that the more nearly normal cells of the thyroid tissue would be the younger. Now since it is well known that in general the ability of a tissue element to withstand or survive an adverse condition is in inverse proportion to its age, it follows that cells of the thyroid surviving such treatment would be of the younger type. This view harmonizes with what is said in the preceding paragraph.

Another consideration is the possibility of a greater susceptibility of abnormal elements to the action of substances of the liquid extravasated from the blood vessels. But since nothing definite is known upon this point, and since its interpretation would in the broad sense be from the standpoint of interference with the respiration of the tissue elements, it is unnecessary to consider it further.

Another possible factor would be in connection with the possible and even probable stimulating action upon the tissue activities, thus causing an increase in the production of internal secretion. But since the question as to whether the general symptoms are due to a hypo- or hypersecretion or to some condition outside of the thyroid apparatus, is so unsatisfactorily answered it would be unprofitable in this place to pursue the view further.

The final results as regards the ultimate glandular changes on the whole depend upon the extent of the initial circulatory alteration. As shown in Fig. 8 after ligation of the inferior and the superior thyroid vein there was at most a very slight decrease in the size of the operated lobe. This figure illustrating the venous supply of the thyroid gland in this animal, shows that the operated superior thyroid vein had a very large anastomotic connection distal to the ligature and also that the thyroid lobes were connected by an isthmus. Both of these structures would render collateral circulation possible, which would tend to prevent the establishment of the desired initial circulatory change.

Generally speaking, the results obtained from ligation of the veins depend upon the extent of primary venous obstruction. This in turn affects the tissues concerned in a way similar to the action of asphyxia in other tissue, the results "depending upon the given state of metabolism when the nutritional change is made, and the extent of the nutritional change in the given condition," as discussed by us in the relation of asphyxia to the central nervous system.

SUMMARY OF DISCUSSION OF CIRCULATORY ALTERATIONS AND REMARKS.

It may be said that the change may be rationally interpreted from the standpoint of primary interference with the respiration of the tissues, which results in the death, disintegration and disappearance of abnormal tissue constituents. Also, accompanying the secondary effects due to the reactions of the tissues, absorption is probably increased so that the abnormal substances are quickly removed from the gland which accounts for their rapid disappearance. The more nearly normal tissue elements being more resistant or perhaps more favorably situated to survive, under the more nearly normal circulatory conditions established through the reaction of the tissues to the adverse condition, which indeed is strikingly similar to the current conceptions of an inflammatory reaction, resume and retain a more nearly normal function.

As to the reaction set up in the tissues, it is explainable as being due to the edema. But this in truth may be only the indirect cause, for the accumulation of metabolic products together with substances originating from the death of tissue elements would probably act either together or the latter alone, more directly in producing an inflammatory reaction.

On the whole, the results indicate that general symptoms of goitre are at least in part associated with deranged functions of the thyroid apparatus. The evidence may perhaps be considered as more conclusive from clinical observations. For it is well established that amelioration or even disappearance of general symptoms may in certain cases follow surgical operations. Also such results are known to follow local treatment of pathological thyroids such as an injection of carbolic acid. Similarly the results reported following ligation of the thyroid arteries, and more recently, as herein stated, the amelioration or disappearance of general symptoms following ligation of the veins as practiced by the writers, or by the senior writer with Dr. Alexis Carrel, with division of the ligated vein distal to the ligature and anastomosis of its peripheral end to an artery so that the vein transmits arterial blood to the gland. The results of the operation of tying the veins were studied by Professor Herman Tuholske, after which he performed an operation upon a human patient with good results. Following the publication of this work, Werelius⁹ repeated the operation with the modification that he tied the vessels by means of purse string sutures introduced beneath the capsule of the gland, and confirmed our results particularly as to the decrease in size of such operated glands, together with changes in structure. He also operated upon a human being in the same manner and from which he reported good results.

It is interesting to note the absence from Werelius' report of histological results of the tissues of such operated glands, or any mention of even a relative increase of the fibrous tissue as compared to the condition before operation or to the unoperated lobe, such as we have observed.

Indeed with us in most cases there has been strong evidence that such fibroses are not only passive but of an active nature. We think, therefore, that the failure of Werelius to observe this must have been due to an oversight, for his published photographs of such glands show that they markedly recede toward normal size, which in itself would certainly indicate at least a relative increase of fibrous tissue as compared with the tissue before operation. For it is known that fibrous tissue is very persistent, therefore it is highly improbable that it would disappear during the contraction of the gland.

From our results, though cases presenting marked general symptoms are not numerous, which is in agreement with the statement made that the occurrence of such general objective symptoms in goitrous dogs is comparatively rare, the evidence speaks for the occurrence of such symptoms as being due at least in part to the deranged thyroid. For such animals as have presented general symptoms have always shown an amelioration or disappearance of such symptoms following operations upon the thyroid veins. But it must be remembered that operative procedures in general themselves may lead to such results in this as in other pathological conditions. The explanation of these results therefore remains obscure.

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ABDOMINAL PAIN.

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The art of diagnosis in abdominal affections consists in a large measure in the solution of the question which organ gives rise to the pain of which the patient complains. Aside from tumors large enough to cause a decided swelling of the abdomen at some point, it is usually pain that drives the patient to the doctor, and the physician is successful or unsuccessful as he is able to determine sooner or later that the pain complained of arises from a disease in this or in that particular organ.

In a broad sense it is true that when any organ is seriously affected, pain is apt to be felt in that part of the abdomen in which the organ is located, and is indicated by the patient placing her hand over the spot, or as is sometimes done, by pointing to it with a finger. Very rarely does the patient complain of pain on the left side when the disease is situated in the right. It sometimes, however, happens, as is well known, in appendicitis. Once in a while, a patient with disease in the right kidney complains of a pain in the left side.

The pain question is not always an easy one, for three reasons: In the first place, the pain may be felt at some distance from the painful organ; (reflex pain); in the second, the patient is often only able to indicate vaguely the location of pain; and in the third place, on the right side there are at least eight different structures which, to my certain knowledge and in my experience, may be confounded one with the other.

Let us glance for a moment at a diagram showing the location of the organs likely to give rise to pain. Leaving out the intestines and the pains rising from a temporary indigestion, these organs are largely located peripherally or around the contour of the abdominal cavity, taking the umbilicus as a centre, and it is in one or the other of these organs that we seek, as a rule, to locate any particular pain.

Patients will sometimes indicate quite precisely the region in which the pain begins, but if the pain becomes more intense and diffuse, the indications are not so valuable.

A pain fixed in one spot almost always means some demonstrable lesion, so that even when a hysterical patient complains of a particular pain always in a particular spot, I always investigate most carefully and try to find some definite cause. Pains which are purely functional or neuropathic in character are apt to be complained of more or less vaguely as burning or migratory and felt in other parts of the body as well; often

they cause the sensation of something moving inside, like a worm or an infant, one of my patients took sixty dollars worth of worm medicine from a quack, so sure was she that she had a worm bothering her.

The study of the question of pain as an aid in making a diagnosis is such an important one that I have been giving it the closest attention for some time past. I would advise physicians in general to follow somewhat the lines laid down in this brief paper on account of the educational value of the study.



Fig. 1.

The diagrammatic sketch shows the location of pain, especially in the lower part of the abdomen, and shows how easy it is to confuse the pain of one organ with another.

K, marks the point of kidney pains.
G. b., gall bladder.
P., pylorus.
St., stomach.
V. a., vermiform appendix.

Ur., ureter.
S. i., sacro-iliac joint.
S. R., sigmoid flexure.
Ut., uterus.
F. t., Fallopian tube.

In the first place, it is a good plan to outline the area of pain on the surface of the body in ink, as suggested by Philander Harris in the transactions of the American Gynecological Society. This has the advantage of causing the physician to delay for a longer study of important symptoms, as well as of fixing the picture well in his mind. For the sake of further comparison and study these skin-records may be transferred to gauze and filed away; or perhaps simpler still, be photographed down and filed, as I have been in the habit of doing lately, in a special book with all necessary references to the history of the case.

The next step in the diagnosis of pain is to attempt to reproduce the pain by pressing upon the organ. This is of course habitually done in

attempting to make a diagnosis of chronic appendicitis, and in gall-bladder and duodenal disease.

It is important also to avail oneself of this method by pressing deep down upon the kidney, by picking up and handling bimanually the uterus, the uterine tubes and the ovaries, asking the patient in each instance if the pain caused by pressure is or is not exactly the same as the pain complained of. I have even carried this method so far in difficult cases as to open the abdomen, or make a large retroperitoneal incision under local anesthesia, so that by handling the various structures one by one, with the patient fully conscious, I could then discover which one gave rise to a like sense of pain. This is a step of utmost value in patients who have had a definite, fixed pain which has hitherto resisted all our diagnostic acumen.

Another way to recognize and differentiate pain on the right or on the left side, consists in catheterizing the ureter and injecting fluid into the pelvis of the kidney sufficient to bring on a mild renal colic. A large percentage of all the vague pains in right or left side, especially those in which the patient grasps the loin between thumb and fingers to show where she feels the pain, are due to a displacement or an obstruction in the upper ureter. Such a patient almost invariably decides at once with the utmost definiteness that the pain thus created is the same, or is not the same, as that of which she complains. (See on this subject a valuable paper by Edward H. Richardson.) It is as a rule easy, if the kidney sources of pain can be eliminated, to decide that the organ which causes the pain is then either in the upper or in the lower part of the abdomen, thus eliminating further inquiry to an investigation of the smaller group.

If great care is thus taken in investigating pain, in reproducing it, and in finding its habitat, we will be less liable to do unjustifiable operations in the future. I have repeatedly seen, and every active surgeon has seen patients who have had their appendix taken out, their tubes and ovaries ablated, and kidneys or bladder operated on, while the seat of the disease was subsequently proved to be an organ other than that subjected to the operation. I have even seen patients who have had as many as two and even three useless operations done in this way.

There is one source of pain, and an important one which it behooves the surgeon always to be looking for, and that is that one due to loose sacro-iliac joint, first discovered, investigated and heralded by Joel E. Goldthwait of Boston. (*Boston Med. and Surg. Jour.*, 1905, pp. 593, 643.) This pain is apt to be associated with more or less severe backache, generally on one side over the sacro-iliac joint. It sometimes extends through to the front of the joint where it is most apt to be mistaken for an affection of some pelvic organ. It can, as a rule, be demonstrated by a shortening of the affected leg and by rotating and forcing it strongly or by pulling it outwards. In other instances the reasoning is more by exclusion. The therapeutic test is a valuable one as most of these patients are relieved by a strong bandage made like a surcingle.

TUBERCULOSIS AS IT CONCERNS THE PHYSICIAN.

By LAWRENCE F. FLICK, M. D., of Philadelphia.

For the physician, tuberculosis is a two-sided problem; the one side being that which concerns him as a citizen, and the other that which concerns him as a physician. The side which concerns him as a citizen is the sociological one. This has to do with the prevention of the disease by public enlightenment, by social reform, by re-adjustment of the customs and habits of life to correspond with modern ideas of sanitation, by an organized effort for philanthropy and investigation, by legal enactment, and by governmental control and governmental aid. This side of the problem has received much public attention in recent years and has been more diligently worked out by physicians than by any other class of citizens. What the physician has done along these lines speaks well for his altruism, for it is against his personal interest, and in a sense takes the bread and butter out of his own mouth and the mouths of his wife and children.

The other side of the problem, namely, that which concerns the physician alone, has unfortunately received less attention, and this, perhaps, puts the physician in a bad light as regards sagacity, because it is a side which might be made very profitable to him without prejudicing the public interest. It is the physician's function to prevent disease in the individual; to cure it in the individual when it has occurred; and when disease cannot be cured, to alleviate the sufferings of the stricken one; and in the exercise of this function lies the physician's sole opportunity for remuneration.

At all times, from the dawn of history, the highest function of the physician has been to guard those who entrust themselves to his care against the enemies of health, whether they come in the form of licentiousness, dissipation, or disease, and for this service, mankind has always been willing to return a good compensation in both money and esteem. No man has ever been held in higher esteem in the world than he who could protect against impediments to health, who could ward off death when disease had broken through the lines of protection, and who could give relief from pain and disquietude. The world has bowed before him and even kings have honored him.

Next to prevention, cure of disease is the most important function of the physician, and in these modern times when so much can be done for the cure of disease, this function has a greater value than it has ever had in the history of man. In the past, cure of disease was more a matter

of pretence than of accomplishment. People got well in spite of disease and the doctor, and frequently, the doctor took the credit for what nature had accomplished in spite of his interference. Whilst there is still much of this pretence and still a great deal of bungling interference with nature's laws, the physician nowadays by wise guidance and even sometimes by direct methods can really bring about favorable results in diseases in which, formerly, only unfavorable results could be looked for.

The other function of the physician, namely, the alleviation of suffering, is only secondary and should always be kept in the background, but, unfortunately, is sometimes thought too much of. From a human point of view, it is perhaps the most attractive, both because the results of its administration are dramatic and because it appeals to sentiment. It is a dangerous function, however, and one which, more than any other thing, has trammelled the progress of scientific medicine and kept individual physicians indeed the majority of all physicians, in the quagmire of mediocrity. The power to ease the sufferings of a fellow human being is so seductive that it constantly leads physicians to do things which, if fully analyzed and shown up in all their influences, would often reveal a broken thread of life which might have held out a while longer had that relief not been sought and given.

In no disease in the whole field of medicine has the physician a better opportunity of increasing his value to himself and his usefulness to others than in tuberculosis. In no field can he give a better return to his clientele for the money which it pays him, and in no field is the money more willingly paid. Exact, accurate knowledge of the prevention of tuberculosis is at present highly appreciated by every one, and intelligent help towards recovery is prized and gladly paid for by every victim of tuberculosis. What the public thinks about such advice and assistance and the value which it places upon them is indicated by the millions of dollars which it pays to quacks and mountebanks for things which have no value but which are held out in the limelight of advertisement as capable of accomplishing the results which are desired.

Few physicians appreciate and realize that there is both a duty and an opportunity for them in the prevention of tuberculosis. They have been so accustomed to think about the matter in the light of public duty and in association with philanthropy and sociology, that they have forgotten what belongs to themselves. The medical profession as a body, through physicians as units of that body, has it in its power to immediately control the spread of tuberculosis and to collect a good revenue from the public for doing it. Of course, this is only theoretically true, but it might be practically true if all physicians had the proper knowledge, training, and disposition to exercise the power which they theoretically possess. In the light of our present knowledge, every tuberculous subject who has become contagious can be made non-contagious through certain practices which are within his ability and which usually, with the assistance

of available philanthropy, can be brought within his financial reach. Were every tuberculous subject made non-contagious, no new cases would spring up and the disease would become extinct with the termination of the cases now in existence. Tuberculous subjects and the families of tuberculous subjects, who can afford to pay for the knowledge and training which positively and actually obviates all danger from the stricken individual, are quite willing to pay for it and will return in appreciation and esteem even much more than they can afford to give in money. To be able to make a consumptive feel that he is not endangering the lives of those who are near and dear to him, and to be able to make those who are near and dear to the consumptive feel absolutely secure against danger of infection in their intimate relations with him, is a power, the value of which, when exercised, cannot be represented in dollars and cents. This power should be in the hands of every physician, but it is not, because of the slowness with which truth and advanced knowledge filter through our medical schools and our medical journals into the rank and file of the profession.

To make a consumptive non-contagious is simple enough to the man who fully understands the subject and who is willing intelligently to direct his patient. Inasmuch as the contagium of tuberculosis is restricted to the broken-down tissue which is given off, and, perhaps in some degree to the excreta, and, inasmuch as these are gross objects which can be easily seen, handled, and controlled, all that is necessary is to devitalize them when they are given off without contaminating the individual who gives them off or the environment in which he lives, or at least to dispose of them in such a way that they cannot contaminate anything and cannot be brought back by any force in nature to a person who might become infected. The only excreta which are at all likely to contain tubercle bacilli are urine and feces, and these are ordinarily deposited where the fermentation that is going on will sterilize them before they can be brought back either to human beings or animals. Practically, there is probably no danger whatever of new implantations in either human beings or animals from these sources. The chief seed supply for new implantations of tuberculosis, undoubtedly, is the sputum given off by people who have tuberculosis of the lungs, and it is this which needs to be looked after above all others.

The correct method of disposing of sputum is to deposit it in a paper sputum cup which can be held close to the mouth, and then burn it. Supplementary to depositing the sputum in a cup, it is necessary that the consumptive hold a paper napkin before his mouth when he coughs and sneezes, that he carefully wipe his lips with a paper napkin every time he expectorates, that he use a paper napkin only once and then fold it up carefully, that he deposit all the paper napkins which he has used in a paper bag which he carries with him for that purpose, and

that he burn these when he has an accumulation of them. The physician should instruct every spitting patient how to do these things and should show him the materials which he should use and tell him in detail why every part of this procedure is absolutely necessary. Unless he does this and does it intelligently, his patient will not carry out the necessary practices or will carry them out only in part, and will thereby defeat his purposes and simply blind himself and his physician in the belief that he is non-contagious when he actually is contagious. The patient who uses the sputum cup at times and spits into a basin or a toilet at other times, and who uses a sputum cup at home and spits on the street when he is abroad may believe himself to be a cleanly person and to be harmless to himself and others, but in reality he is uncleanly and is dangerous both to himself and to others. A moment's thought will convince anyone who has had the opportunity of making observations on the spitting habit, that spitting away from the body sprays some sputum on the clothing of the person who spits and that no care in spitting can obviate this accident. The amount of sputum which is sprayed off in one expectoration, of course, is very little, but the amount which would accumulate upon the individual's clothing, in days and weeks, is considerable, and in a fairly advanced consumptive, is enough to contaminate the clothing in such a way as to make it give off dry tuberculous matter in the form of fine powder, every time it is agitated sufficiently. Spitting into cloths, or into paper napkins, is a very reprehensible practice because it is almost certain to contaminate the lips and hands of the spitter, and it is quite certain to contaminate his pockets and his clothing. Nothing, except the use of a sputum box, which can be held close to the mouth, should ever be tolerated by the physician. There are different kinds of paper sputum boxes available, anyone of which can easily be carried in the pocket. Physicians should see to it that a full supply of these sputum boxes and of paper napkins and paper bags be kept in every drug-store and be made available to every person who needs them.

When the consumptive becomes advanced in the disease so that he has to be confined to his bed, the problem of making him non-contagious becomes a little more difficult, but is still within the grasp of the resourceful physician. At this stage, the aid of a nurse or of some properly trained person is necessary, because the consumptive himself has no longer the physical and mental strength to co-operate efficiently in preventive practices. Through weakness and through forgetfulness, he soils his body linens and his bed linens with sputum, he soils his hands and his lips with it, and he spills it on the floor and on the furniture. Somebody must immediately sterilize the linens, cleanse the hands, lips, and face of the consumptive, and wipe up the floor and furniture when these contaminations take place. Among the very poor, this can only be done in a hospital, because the expense of doing it outside is too great to permit of it. The very poor should therefore always be removed to a hospital

and physicians should help break down the prejudice which now exists in our general hospitals against the admission of consumptives. There is no good reason at the present day for excluding a consumptive from a general hospital, because, with our present knowledge, a consumptive may be treated in a general hospital without the slightest danger to anyone else. To exclude him is a confession of ignorance and incompetence. Among the fairly well-to-do, the physician can easily train a member of the family to take care of the consumptive and to do those things which the patient himself can no longer do for the proper disposal of sputum. This training, however, should be thorough and should be followed up by supervision so that it may always be effective. The physician must not be content with merely telling the attendant what to do, but should show her how to do it and should continually watch whether she does it right.

There is a side to these preventive practices which is usually overlooked and which mean a great deal both to the physician and the patient. It is the part which accurate and definite prevention plays in the cure of the stricken individual. Tuberculosis has very little self-limiting capacity. It does gradually set up an immunity in the individual, but usually that immunity comes when it is too late, when, indeed, so much destruction of tissue has already taken place that the organism no longer possesses the necessary machinery for its own preservation. There is, however, a very great tendency to recovery in tuberculosis, and every tubercle which breaks down and comes away marks a step towards recovery and registers so much consumed energy by the organism for its self-preservation.

It is quite probable that re-implantation of the individual by the bacilli which have already been cast out is the chief seed supply for new growths. The tuberculous subject, therefore, who contaminates his hands and lips, his clothing and his environment, is constantly taking back bacilli which his organism has once rejected, and is thereby continuously throwing additional burdens upon his organism. That he sometimes gets well, in spite of this, is indeed marvelous, but usually he does not get well under such practices. Long observation of tuberculous cases has convinced me that with complete avoidance of re-implantation with bacilli given off by the consumptive himself, on account of the great tendency to recovery, most persons would get well with this measure alone were it practised from the very beginning. Making the tuberculous subject absolutely non-contagious is indeed the one best remedy in the treatment of tuberculosis for its cure.

In the curative treatment of tuberculosis, the physician at the present time can accomplish a great deal provided he is familiar with all the resources at the command of the profession, studies his case carefully in every detail and devotes himself enthusiastically to his work. Until recently, tuberculosis usually was looked upon as an incurable

disease, and many physicians still look upon it as such, or at least, are quite skeptical as to whether anything can really be done to bring about recovery. They still hold the old idea that change of climate may accomplish something; and, that while, perhaps, milk and eggs may do something, nothing can be accomplished worth while by medication or regime. Nowadays, most physicians do prescribe the milk and egg treatment and the fresh air treatment in a very general sort of a way, but beyond this they have very little to offer. During the last year or two, a great many men have also taken up the tuberculin treatment, but this, too, in an uncertain manner. All of these things are indications, however, that the profession as a body is awakening to the fact that tuberculosis is a disease which can be treated scientifically, with fair prospects of accomplishing desirable results.

There is, perhaps, no disease in the entire category of diseases more difficult to treat than tuberculosis and more yielding to treatment in the hands of a competent man. Every case has peculiarities of its own and must be treated in its own way, even though the general principles of treatment may be the same. In every case, moreover, conditions are liable to change from time to time, demanding a change in the treatment, and the physician must be on the alert to discover such changes as soon as they occur, as failure to discover them may jeopardize the chances of the patient for recovery. Changes of this kind do not often occur suddenly, but come on insidiously and clandestinely in such a way that they take one off his guard. A pleurisy may set in, for example, an effusion may take place, a nephritis may develop, or a localized pneumonia may grow out of an ordinary cold,—anyone of which, unless quickly recognized and corrected, is apt to lead to serious consequences. The stomach and the intestinal tract of the patient need constantly to be watched, because they may at any time be subject to functional disturbances of one kind or another.

In order to treat a case of tuberculosis skilfully, it is necessary that the physician first make himself familiar with the temperament, constitution, and the physical condition of his patient, and with his personal and family history. As far as possible, he should know all the weak points and all the strong points of his patient and he should completely understand his physiology so that he may be able to correct promptly every deviation of a function of the body from its normal physiological condition. He must know the weak points in the temperament and character of the patient in order that he may bolster them up. The treatment of tuberculosis is a long one and requires an optimistic turn of mind, a hopeful temperament, and a grim determination to do whatever is necessary, however difficult, for success. The physician must be able to keep his patient at doing hard things, not for a day or a week, but continuously and without intermission for months and sometimes for years. Even a temporary intermission of the regime which is necessary may prove to be the cause of failure in the end.

There is no specific remedy in tuberculosis, but there are many remedies which can be made to serve a useful purpose in cases to which they are adapted. Neither is there a specific plan of treatment, but there are many plans which may be successful in the hands of men who fully understand them and who are skilful at applying them. Everything depends upon the care and intelligence with which remedies and methods are used. Above all things, the treatment of tuberculosis should never become routine, except in the general plan, and this should be adhered to steadfastly, unless there is a good reason for changing it. Frequent and spasmodic change of plan of treatment never leads anywhere except to failure.

A few general principles can safely be laid down for the treatment of tuberculosis and these may be followed out in practically every case. First, the diet should be carefully fitted to the capacity of the individual to digest and assimilate it. In amount, it should not exceed what is necessary for the demands of the organism for fighting the disease and for storing away a little surplus. The food which will give the largest return with the least labor should be selected, but care should be taken that in the selection of this food, no idiosyncrasy of the individual be permitted to defeat the object sought after. For most people, milk and eggs with one meal of solid food a day, give the basis of a correct diet for a tuberculous subject, but occasionally, one meets an individual with idiosyncrasies which militate against such a basis of diet. The much used term of "forced feeding," must never be construed to mean stuffing, but should be interpreted to mean that the patient takes the selected diet against his inclinations if necessary and under the force of his own will, rather than through craving for the food. Misinterpretation of the meaning of forced feeding has led to much mischief in the treatment of tuberculosis and has been responsible for a great many failures.

The second principle is that drugs may be used advantageously for putting a function of the organism into a physiological condition, or for aiding an organ of the body which is crippled in its functions, but should never be used for any other purpose. To give drugs because somebody else has used them, without understanding what they may accomplish or how they may accomplish it is bad practice. It is better to give no remedies at all than to use remedies which one does not fully understand.

Third.—Climate has no specific value in the treatment of tuberculosis. Change of scene and environment may be of use in cases in which the mental attitude is bad, but only in so far as it corrects the mental attitude. The best place in which to treat a case of tuberculosis is that in which the individual to be treated can get the greatest amount of happiness, the best food, the best hygienic conditions and most comforts of life for the smallest amount of money and with the least worry. For most

people, this is in the home or at least within easy distance of relatives and friends.

Fourth.—People of weak character, people living under bad domestic conditions which cannot be corrected, and people who cannot command the attention and service necessary for their treatment at home should be moved into a sanatorium. Perfect discipline and strict compliance with the rules laid down by the physician are essential for success in the treatment of tuberculosis, and where the individual is so weak in character that he will not carry out the treatment, in both spirit and letter, success cannot be attained except through the influence of others who understand something of the treatment. This influence can only be obtained in a sanatorium. To try to do the best one can with a patient under bad sanitary conditions and without proper supervision and attendance is foolish, because it always ends in failure.

Fifth.—Restoration to physical health is not synonymous with cure in tuberculosis and treatment of the disease cannot be safely stopped when physical health has been recovered. A disregard of this principle leads to more failures in the treatment of tuberculosis than any one thing. So long as the patient looks ill and feels ill, it is relatively easy to secure his co-operation and the co-operation of his friends, but when he begins to feel well and to look well to his relatives and friends, co-operation often ceases, and the patient takes himself into his own hands or places himself under the direction of his family. It takes years to recover from tuberculosis, under the most favorable conditions, and the physician who commits himself to the idea that a tuberculous patient has recovered in a few months because he has regained the appearances of health is apt to experience an humiliation later on, if he lives long enough, in seeing his patient transferred to an undertaker. No case, however well, should ever be reported as cured. It is much safer to use the term "disease arrested," and to look upon every case as liable to a recrudescence of the disease.

Sixth.—Whilst rest and exercise are both useful in the treatment of tuberculosis when properly used, rest should always be used where there is doubt, because it can do no harm and exercise can. In the acute stage of tuberculosis, absolute rest should be insisted upon, and it should be maintained until all acute symptoms have passed off, even if it takes a year for this to occur. In fact, time cannot be considered in the treatment of tuberculosis. However long it may take to bring about recovery, one must be reconciled, because haste is almost certain to lead to fatal errors. Impatience to get about and to be doing something is frequently the cause of prolongation of the disease, because every time the patient gets into a fair condition he becomes active and has a relapse, going back to a little worse condition than he started from the time before. To recover from such a relapse takes months and valuable time is frittered away without any real progress being made. The physician

must be firm in his insistence on absolute rest until he is fully convinced that exercise may be taken with safety and profit. When exercise is begun, it should be under the supervision and control of the physician.

Seventh.—Stimulants, depressants and opiates should be avoided, unless there is a very specific, peremptory reason for using them. When used, they should be prescribed in the smallest quantities possible and never left to the discretion of the patient or the judgment of a nurse. Alcohol may be used advantageously in certain complications of tuberculosis, but in the hands of most men, it is more likely to do harm than to do good. Tobacco should not be used except, perhaps, after dinner and then only by patients who are in good physical condition and who have a strong, vigorous heart action. The more skilful the physician becomes in the treatment of tuberculosis, the less opium will he use. The experienced and competent physician can get along without the drug, except perhaps, in a few cases during the last few days of life, especially when there is a laryngeal complication.

Eighth.—Fresh air is essential to the correct treatment of tuberculosis. This does not mean that the patient must be frozen to death in winter, but merely that there must be avoidance of re-breathing the same air twice. The ideal life is in the open air, because then it is physically impossible for any of the air which has been exhaled to come back to the patient. Satisfactory conditions for a proper change of air can, however, be produced in a room even with a comfortable temperature by having the windows open on two sides of the room. In winter, heat in a room aids ventilation and is of benefit. Unfortunately, it is very expensive to heat a room with the windows open and most people must content themselves with a cold ventilated room for sleeping purposes, at least, if they are to have ventilation at all. An economical way is to have the patient sleep in a room without heat, and eat and dress in a room which is heated and fairly well ventilated. Drafts need not be regarded in arranging for the ventilation of a room, as they can do no harm when the patient is properly clad and properly covered while in bed and are really essential to a proper change of air. It is by movement that the air cleanses itself of its impurities, and it is only when the air in the room moves rapidly and the warm, polluted, expired air gets away from the patient quickly that the patient avoids re-breathing the air which he has exhaled.

Ninth.—Tuberculin, bacterin and sera have a value in the treatment of tuberculosis, but should always be used cautiously, and unless well understood had better not be used at all. Tuberculins need to be used with greater caution than bacterins and sera, because their abuse is fraught with greater danger. One must always keep in mind when using these substances that the injury that may come from their improper use may be very far-reaching and irreparable, and that in the long run it may be safer to go on without using them. All of them should be started in

small dosages and unless the physician feels secure in his position should be continued in small dosages. It is not practicable to guide their use by the Opsonic Index and the physician must, therefore, learn to use them in an empirical way. A very safe and useful way of getting serum treatment for a patient is by putting on fly-blisters and absorbing the serum from the blister. This gives the patient his own serum and is followed by excellent results.

Tenth.—Excretory functions of the patient should be kept active in order that the poisons generated by the micro-organisms which are infesting him may be kept out of the system, and also in order that the debris and used-up substances which probably give a good pabulum for the growth of micro-organisms may be kept as low in the organism as possible. It is quite probable that most of the disease-producing organisms grow on the dead tissue in our bodies rather than on the living tissue, and that just in proportion as we have dead tissue and used-up material circulating in our blood and in the juices of our bodies, micro-organisms find good soil for their growth. The skin which is the largest eliminatory organ of the body should be kept clean and active, and for this reason should receive daily ablutions and frequent scrubs with soap and hot water. The bowels should be kept flushed out preferably with Epsom salts. The kidneys are usually well flushed out by the liquid diet. Nothing should be used for aperient purposes which can in any way congest or irritate the intra-abdominal organs. Next to Epsom salts, castor oil is the best drug at our command for cleaning out the bowels in tuberculosis.

In the matter of alleviating pain and disquietude of every kind, the physician should resort more to mental influence than to drugs. With most people a little reassurance is all that is necessary. There are a great many fugitive pains in tuberculosis which grow with dwelling upon them, and which can be relieved promptly by an assurance from the physician that they have no evil import. Pain which is due to an inflammatory condition, such as occurs in pleurisy, can best be relieved by putting the part at rest. Cough and nervousness can usually be controlled by rest and by the will power of the patient when properly brought into play. Frequently, the remedy which is needed for all of these complaints dependent upon the nervous system is absolute rest in bed, and when it is needed, it should be resorted to without hesitation and without compromise.

Finally, the physician must know how much tuberculosis his patient has, and what the complications are. Tuberculosis begins first as an uncomplicated disease, but rarely comes to the attention of the physician as such. Usually, the patient consults the physician when the first serious complication has set in and consults him for the complication, rather than for the tuberculous process itself. The complications which most frequently bring the tuberculous subject to the physician are colds, grippe, pneumonia, pleurisy, hemorrhage, inanition and various forms of gastric

disturbances. Most of these complications, at least those of an acute form, are self-limiting, provided the patient is put at rest and his organism is given a chance to recover itself. They are misleading, however, when first encountered and may give the physician a very erroneous idea of the amount of tuberculous process which is going on. One should be very careful, therefore, about giving an opinion as to the tuberculous involvement when he first sees a case in an acute condition. On the other hand, one must also be on his guard against being misled in the other direction into an idea that there is not much tuberculosis in the case when the acute conditions have passed off. Every case should be carefully studied physically and should be charted with an analysis of all the pathological conditions and functional disturbances, so that as far as possible, a clear-cut idea may be formed of how much tuberculous process there really is. The prognosis of a case and the plan of treatment hinge largely upon the amount of tuberculous involvement. Patient, persevering effort in studying a case will enable any physician of fair training to reach satisfactory conclusions in these matters, and when he cannot reach them, he should, by all means, call for assistance before he goes on with the treatment of his case. Nothing is more foolish than for a physician to try to treat a case blindly, for when he does it, he invariably fails in obtaining results and ends in confusion. It will no longer do for the physician to ease his conscience by saying to himself that he is doing as much for his patient as anyone else could do, and that he is, after all, dealing with a disease in which favorable results are unattainable. As good, if not better, results can nowadays be obtained in the treatment of tuberculosis as in any disease with which the medical profession has to deal, and when the physician does not obtain good results, it is because he does not possess the knowledge and skill necessary for obtaining such results. Often, it is not so much the want of knowledge and skill as the want of honest application of them. It takes time to study a case of tuberculosis well enough to be able to treat it well and it requires painstaking work. The physician must recognize this and he must also recognize that the time and pains which are necessary can only be given for a commensurate fee and he must have the courage to charge the fee which is necessary to be able to do the work. He need not see his patient often, usually not more often than once in two weeks, and sometimes not more often than once in a month, but when he does see him, he must study him carefully, and give him the best that he has. If he has made his first study of the case thoroughly and has kept the proper record of it, the time and labor required for subsequent visits are much less, but, at every visit, he should go over his case thoroughly enough to be able to determine definitely whether any complications have occurred, or any new developments have taken place in the interim between the visits. With this kind of treatment and supervision, the physician who is willing to give it will find in tuberculosis a remunerative and satisfying field of labor.

A FREQUENT ETIOLOGICAL FACTOR, COMMON TO FACIAL MALFORMATION AND ACUTE INFECTIOUS DISEASES.

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The need of a paper along some such line as the following, was suggested by some of the Medical School Inspectors here in Chicago as well as by the Medical Superintendent of the Talulip Indian Agency, Washington.

These men, in the daily discharge of their duties, feel that the training they have received in the Medical Schools upon dental subjects was too meagre, and that a broader knowledge of some of the more common dental subjects would assist them in the discharge of their duties as well as better serve the patients themselves.

A study of the normal mouth of a five-year-old child shows twenty teeth, five on either side of the median line above and below, the upper anterior teeth overlapping the lower teeth and the cusps of the upper interlocking with the lower molars in occlusion.

In order that the general practitioner or family physician may be better able to cope with conditions of the child in later life, conditions which are now being recognized as of vital importance, it is necessary that he be conversant with more of the problems of dentistry as they pertain to the health of the individual. As yet, although Boards of Health recognize the importance of healthy teeth and their bearing upon the individual and civic health, there is very little along this line taught in the medical schools. It is not intended that the Medical School Inspector cover the ground expected of a Dental School Inspector, but the problems of health and disease having such an important bearing upon the conditions found in the mouth, it is necessary that the physician should be able to recognize these conditions in their incipency and recommend proper treatment. It is important that the physician make a diagnosis of conditions found in the mouth and have some idea of what will happen if the case in hand is allowed to go on unattended. It is the physician, and not the dentist, who first sees the child, and if he through carelessness or ignorance does not recommend the needed dental services, the child too often is allowed to suffer irreparably before receiving such services.

Many of the so-called cryptogenic infections may be traced to cavities in the teeth. These same cavities harbor the germs of infectious

diseases long after the child has recovered from them; and just as a typhoid patient, whose gall-bladder harboring the typhoid bacillus, is a menace to the community, so is the patient who has had diphtheria a source of infection long after the bacilli have disappeared from the throat and other mucous membranes. These germs are not affected by antitoxin because they lie secluded within cavities whose walls are not bathed in blood-serum carrying the therapeutic agent.

The importance of the first permanent molar cannot be overestimated, as it has a multiple bearing upon the health of the individual. Therefore, it should be recognized by the parents and family physician as soon as it makes its appearance above the gum. At the age of about six years, this tooth appears behind the temporary teeth, and as the child has as yet lost none of the temporary teeth, it is often mistaken for a temporary tooth also. It can be easily recognized, as it is the sixth tooth from the median line. The upper first permanent molar is the largest tooth in the mouth, the lower one, the second largest. In shape the lower one is trapezoidal, having five cusps, five grooves (the buccal groove extending over the buccal surface often ends in a pit), and a central fossa.

The upper first permanent molar is rhombic in form, having four cusps, four grooves and two principal fossæ. The cusps correspond to the developmental lobes and points of beginning calcification, while the grooves mark the lines of coalescence between the lobes. Why these strong, well-defined cusps and deep fossæ?

It must be emphasized that these cusps of the four permanent teeth taken together, fitting into their respective fossæ, are the key to character as shown in the face. Should these cusps not properly interlock during occlusion, a weak, small receding chin, excessive prognathism, or a "scissor-bite" results, depending upon whether the bite is posterior, anterior or lateral to its normal position. These four teeth maintain the proper relation of the jaws to each other while the rest of the permanent teeth are in the process of eruption. They also act as the foundation against which the forces of facial development are directed. If the foundation is faulty or not stable, proper facial development does not take place. The lines, planes, and angles of the cusps and positions of the teeth in the jaws are so designed, that the force of mastication together with the inherent force of growth, carries the jaws forward and outward and, together with them, the bones of the face and nose. This is not a movement *en masse* but an actual growth. The pressure exerted by these teeth in their growth causes a continual resorption of existing bone which is as constantly rebuilt, the result being an actual growth.

A careful study of a normal set of teeth in occlusion, their position in the arches, and of the individual teeth, shows what we are pleased to call the result of the inherent forces of nature. We can see that nature has not disregarded any of the laws of physics but, on the contrary, has very wisely made use of them.

Irregularities of the teeth invite decay and disease of the gums with all their dire results, and loss of the first permanent molar is a prolific source of irregularities. Why does the first permanent molar decay so early in life? It erupts at a period in life before immunity may be said to supervene. We know that we do have periods of immunity from decay. Lack of care of the teeth at this age is another cause. Irregular eating of improper foods and sweets, together with intestinal disorders so common to childhood, are accompanied by abnormal conditions of the oral mucous membranes inviting fermentation. Calcification of this tooth occurs at a time when the child is prone to have various diseases of childhood, in consequence of which metabolism is interfered with and faulty calcification occurs (the counterpart of Hutchinson teeth, which are not syphilitic except that syphilis may at this time so disturb metabolism that faulty calcification results).

The lines of coalescence between the lobes are often faulty and fissures in the enamel result. Possibly the agents which cause hare-lip, cleft-palate and similar conditions, play a part in tooth formation as well; at any rate, the faulty formation harbors the bacteria of decay and they begin their work of dissolution of lime salts. Decay having begun, why is it neglected? For the reason that lack of knowledge on the part of parents, due to the fact that their attention is not usually called to the trouble until it gives pain and much tooth substance has been destroyed, is the real obstacle. They, not knowing that the child has erupted a permanent tooth, believe the offending member a temporary one that will soon be lost; hence, they think it of no consequence. The family physician, who has probably been called a number of times to treat some slight illness, has not noticed the decayed tooth, and has not pointed out to the parents that the child needs the services of a dentist, in order that one of the most valuable teeth of the mouth may not be lost.

Lack of Care of the First Permanent Molar and Consequences.—As these molar teeth at this time bear the brunt of the stress in mastication, the loss of the tooth itself as a valuable member in mastication is a serious matter. Again, if the tooth is lost, the foundation, upon which rests the centre of resistance necessary to the development of that side of the jaw or face, is lost, and a contracted arch, irregular teeth and asymmetry of the face result. Now that the natural forces of nature are diverted, they act just as strongly as though they were being exercised in a normal manner, and, in consequence, there is an ever-increasing deformity.

Upon eruption of the second permanent molar, a new difficulty arises—namely, the second molar being unsupported mesially, is tipped over forward and partially fills in the space left by the missing member. The development of the third molar is largely responsible for this and instead of a proper occlusion, the grinding surface of the tooth is directed forward, this change of position inviting decay between the second and third molars and disease of the adjacent soft parts.

Lack of development of the bones of the face is synonymous with inadequate and malformed nasal passages, with consequent adenoids, frontal, or ethmoidal disease. It is necessary that the child use all the teeth, and the more normal stress regularly brought upon them the better, as it furthers development of the face and jaws.

The face, as an index of character, is not entirely predestined, but by carelessly allowing lack of normal development to occur, which will occur if, by extraction or loss of teeth, the normal development of the lower jaw and chin is prevented, the child's face is stamped as one who has lack of determination, weak will power, etc., and because of his appearance he is taught and treated as though this were the case. Finally, he himself believes it and really becomes so. On the other hand, had appearances not been deceptive and by caring for his teeth it had been granted him to develop normally, his face would have borne no such stigma and in reality he would have had a stronger character.

Caries of the enamel progresses slowly, beginning frequently in the faulty fissures of the crowns where the organisms find lodgment, but once through the enamel, the process goes on rapidly, undermining the enamel which to the unpractised eye shows very little change, until finally a large portion of the enamel breaks down, revealing a large cavity whose walls are of decalcified dentine, the removal of which exposes the pulp. This may have gone on painlessly, but now the pressure of food during mastication causes pain and the child avoids chewing upon that tooth; and if similar cavities exist on either side of the mouth, the food is not masticated and the foundation for gastro-intestinal disorders is laid. Not only this, but the plan of development is thwarted. Nature has so placed the teeth in the arches, that their use stimulates normal development and growth, and if these forces are not utilized, normal development does not take place. The proper use of the teeth is also designed by nature to act as a cleansing agent in that the forms of the teeth and inter-dental gum-septæ govern the excursion of food over their surfaces, thereby keeping them clean. Cavities and pockets between the teeth harbor not only pathogenic organisms, such as cause diphtheria, scarlet fever, pneumonia, etc., but saprophytic organisms as well, and it does not require a vivid imagination to grasp the dangers which accompany the "swapping of gum," biting of each others' apples, etc., as children are prone to do. Not only is disease spread in this manner, but the process of germ proliferation, especially of the saprophytes within carious cavities, is a menace to the health of the child within whose mouth this action takes place.

The constant absorption by the mucous membranes of the mouth and throat, as well as swallowing the ptomains, or if you please, leukomains, is without doubt, the cause of much malnutrition with its consequent lack of resistance. It seems probable that cervical adenopathy, as well as tonsillar disease, may have its origin in carious tooth cavities.

At least, the process may be prolonged or repeatedly reimplanted from these dépôts.

The etiology of pernicious anemia has been pointed out as being related to just such cavities. We know that the germs of the infective granulomata are found within carious tooth cavities, the tubercle bacillus in great frequency. From these cavities, the organisms pass either by continuity of gum-tissue, or through the pulp chambers and root canals, into the deeper tissues and there set up their growths.

Alveolar abscess, to the general practitioner, is rather a vague term, but as a matter of fact it is but an osteomyelitis and should receive the treatment given that process in other parts of the body. Alveolar abscess very rarely occurs unless the pulp of a tooth has died. The organisms follow in the wake of a carious process, and when the pulp chamber is exposed, the necrotic pulp forms a pabulum for the germs. They finally pass out through the apical foramina and set up their activity anew. The process may be acute or chronic, usually acute becoming chronic, and it is these chronic abscesses extending with acute exacerbations over a period of years, that give rise to infections in other parts of the body, particularly in the larger joints, with resultant partial or complete ankylosis.

Prof. G. V. Black has found that there are less than twenty micro-organisms, most of them non-pathogenic, which may be said to be indigenous to the human mouth; myriads of others flourish for a time, then die out only to be reinstated at some future time. It seems quite rational to suppose that if the mouth be kept in a better sanitary condition, there would be less tonsillar disease.

Somewhat contrary to the belief of many, it seems that if the proper use of the tooth-brush be supplemented by an efficient antiseptic mouthwash, much bacterial life could be destroyed. I should recommend a mouthwash containing oil of cassia or cinnamon, which is pleasant and most efficient, notwithstanding the fact that the synthetic oil, which is about one-half as efficient as the natural product, has supplanted it.

Aside from the philanthropic side of the question, and from a cold monetary view of the subject, it is cheaper for the individual, who is taxed to support the criminal and charitable institutions, and for the State, which must support them for the protection of society, to limit the number of criminals and delinquents rather than care for them afterward. To this end, the limitation must begin with school-children. Children who are delinquent in their studies are so because of some active cause which may be one of many. Poor health is the one broad term which expresses the sum total, comprising poor hygiene at home and at school. How much more active are these causes upon the organism which, on account of physical deformity of teeth, mouth, face and nose, must breathe through its mouth, furthering the development of adenoids and of hypertrophic tonsils that results in listlessness, lack of am-

bition, and a dulled mentality. On account of the inability of children to keep up with their classes, they are often neglected, even chastised by their teachers; and here begins a rebellion which increases in its scope and development, until the child attains its majority and acts in open defiance of all law and order. Should the causes be active enough seriously to arrest both mental and physical development, the individual finally lands in an almshouse, where he must be maintained by the State, and that means taxation of the individual citizen. Would it not be better to care for the growing child and assist for a time during his formative period, so that ultimately, through his own efforts, he would be a valuable citizen of the commonwealth, than to allow him to grow up and become a ward of the State, which means a ward of society at large?

RESUME.

(1) The first permanent molars erupting at about six years, are the most important teeth in the mouth.

(2) They appear before any of the deciduous teeth have been lost.

(3) The loss of one or more of them invariably leads to faulty development of the dental arch, faulty development of the bones of the face and nose or both.

(4) Decay should not be allowed to persist in the mouth because by it the teeth are lost and cavities harbor pathogenic organisms, endangering not only the patient himself but those with whom he comes in contact.

(5) Cavities in teeth also harbor the putrefactive organisms which produce ptomaines.

(6) Much of what has been said regarding the first permanent molar applies to the other teeth, both temporary and permanent as well.

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UTERINE HEMORRHAGE: ITS RELATION TO UTERINE CANCER.

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In the performance of my duties at the St. Louis Skin and Cancer Hospital, during the past four years, I have given special attention, in the taking of histories, to the relation which hemorrhage bears to the other early symptoms noted by the patient. When one considers how extensive has been the propaganda of education concerning uterine cancer, in the past ten years, it would certainly seem that the profession must be alive to the importance of hemorrhage as a symptom of the most urgent significance. This makes it all the more disheartening to meet patient after patient, giving what has become almost a classic type of history—which, in retrospect, might well be termed a history of neglect. We hear much of the need of education of the laity concerning this subject, and the St. Louis Skin and Cancer Hospital has tried various measures to effect such education, but when it is so very common for patients to say that their physician has made no local examination; or, having made an examination, has advised douches and given comforting advice; or, perhaps, has given local treatment for “ulcerated womb,” extending over weeks and months of the most important time in the patient’s life—when, day by day, we note such things, it certainly seems that the profession needs education. We have of course been careful not to add to the misery of the patient by intimating that there has been any seeming neglect, even in the most palpable cases, but there can be no doubt that the profession must bear much of the blame in cases of inoperable uterine cancer; for, as in breast cancer, the disease rarely advances rapidly without manifesting its presence by the appearance of some abnormal sign or symptom. I believe we diagnose tuberculosis in its early stages because the patient demands an explanation of the cause of any chest symptoms, and, in like manner, if the woman with abnormal blood-showings demanded a positive denial of the existence of cancer, I believe we would be more careful.

But while it is easy to censure the medical attendant for negligence in failing to avail himself of the common methods of making a proper diagnosis, it must be admitted that at times the cause of abnormal hemorrhage is very difficult to ascertain, and, as will be seen when we consider blood-losses at the menopause, we are often forced to admit that no sufficient cause can be assigned. But while we recognize the facts

that many women do not menstruate regularly, that the menopause is not established in a uniform manner, and that the menstrual flow often recurs from time to time, during the two years subsequent to the date of cessation of the regular flow, the point I wish to emphasize is that the knowledge of such facts must not deter us from a careful study of each case, keeping well in mind the constant fear of error in our explanation; and it can be only after we have submitted the product of repeated curettings to a careful pathologist that we may be permitted to deduce the cause of "idiopathic hemorrhages" from sound reasoning, as Kubo suggests.

The symptom of the greatest importance in the early recognition of uterine cancer is abnormal hemorrhage. Our records show that, of all the cases occurring during menstrual life, only one gave a history of normal menstruation, and absence of intermenstrual blood-loss. She complained of pain in the lower abdomen, and was the only patient who presented such an anomaly. Of the remaining cases occurring during menstrual life 56 per cent. gave a history of intermenstrual blood-losses, while 44 per cent. gave a history of increased menstrual flow.

Of the cases which developed after the menopause 67 per cent. complained of hemorrhage as the first symptom; 23 per cent. first noticed a discharge without bleeding, while but 10 per cent. complained of pain attended by discharge of "leucorrheal" nature as the first symptom. By blood-losses we mean all discharges of this nature, from the occasional drop after intercourse, or coughing, on lifting, to the sudden, unprovoked "gushes." This point should not be forgotten in questioning our patients, for they usually remember only the large losses of blood.

It is not the object of this paper to consider all the causes of unusual uterine hemorrhage, nor to discuss the constitutional conditions attended by metrorrhagia, but briefly to cite the more important local lesions, which might obscure the diagnosis of malignancy. We will then consider hemorrhage occurring abnormally; first, during the pregnant state; second, during menstrual life without pregnancy; and third, after the menopause.

In hemorrhage appearing during pregnancy we think of (a) abortion, (b) premature separation of the placenta, (c) placenta previa, or (d) ectopic gestation. The history and examination required for the diagnosis of either of these conditions should preclude the possibility of failure to recognize a concurrent malignant involvement of the uterus. It is only when we bear well in mind that cancer may occur independently of any condition of the uterus or adnexa that mistakes in diagnosis will be avoided. Even slight discharges of blood during normal pregnancy may be deceptive, as in case No. 522: Patient, aged 33, gave a history of occasional hemorrhage of slight degree, occurring after coition during the latter half of pregnancy. Though she consulted physicians for this disturbance she was not examined, nor was she examined after delivery. She again consulted different physicians at four and six months after

delivery, when she said the bloody discharges were quite free, yet no examination was made. One and a half years after delivery she appeared at the clinic with an inoperable cancer, involving the cervix and vaginal vault.

Despite the well-known fact that cancer frequently causes abortion, we have received several cases of advanced cervical carcinoma, which gave a history of abortion, followed by small hemorrhages, treated by douches without an examination having been made. These facts are certainly deplorable.

Hemorrhages during menstrual life without pregnancy.—Under this heading we have a great variety of conditions which may cause us to overlook the diagnosis of incipient or early cancer. Common among these are (a) endocervicitis, (b) cervical lacerations, (c) cervical chancre, (d) endometritis, (e) tubal neoplasms, (f) salpingitis, (g) benign uterine growths, (h) chorio-epithelioma, (i) idiopathic menorrhagia and metrorrhagia. Less common are (j) blood cysts of the uterus and (k) tuberculosis of the cervix, neither of which I have observed. Huguin and Lebert (*Rev. de Gyn. and Chir. Abs.*, 1907) describe two varieties of blood cysts: (a) from obliteration or rupture of angiomas, and (b) from transformation of preëxisting cysts. In both there is hemorrhage and severe pelvic pain. Hysterectomy is alone of any benefit. Tuberculous ulcerations of the cervix are divided by Lannes-Dehore (*Thèse de Lyons. Abs. Zentralb. f. Gyn.* 1906, 34) into the miliary, ulcerating and proliferating varieties.

Referring now to the more common types of uterine lesions, as above noted, I believe there are four classes of cases deserving of marked attention. At least these four classes have been more common in my experience, and, from the histories of patients applying to the St. Louis Skin and Cancer Hospital, they have been productive of more errors in the practice of other physicians than have other lesions occurring during menstrual life. These classes are: (1) Endocervicitis, (2) chancre of cervix, (3) small benign growths, (4) deep cervical lacerations.

(1) In endocervicitis of the chronic type the infection produces eversion of the mucosa, with infiltration of the tissues and nodosities due to the infected Nabothian glands. We commonly have also marked menstrual disturbances. (2) In cervical chancre, the slight erosion with the customary infiltration, before the occurrence of the rash, is quite suspicious of beginning malignancy. I have observed three chancres which developed on old lacerated cervixes and all were accompanied by prolonged menstruation. All were in married women and only the prompt report from the pathologist's examination of a wedge of tissue, submitted to him for diagnosis, relieved the anxiety, for in one case the secondaries did not appear until eight weeks after the case first came under observation. (3) Small benign growths protruding from the os,

with inflammatory involvement of the parametrial tissues, or with irregular enlargement of the uterine body by small fibromata, also render an immediate diagnosis impossible, especially as the blood-losses cause a suspicious loss of flesh and strength.

(4) Deep cervical lacerations, with enlargement of the uterus and attendant menorrhagia, are very common and should be regarded with more fear than is customary. It is a reproach to the science of obstetrics that women are dismissed, after labor, with torn cervixes, when intelligent care would restore them to a normal condition. It is now perfectly safe to examine the cervix on the seventh or eighth day after labor, and equally safe to repair any lacerations at that time. Since Hirst first spoke of this procedure the writer has pursued this course, without any infection or complication developing. No anesthesia is required for the slight scarification and the application of the ligatures require no handling of the parts even with the gloved hand. The intelligent use of retractors and the mobility of the cervix permit repair even in the presence of a recently restored perineum. There can be no doubt that this procedure contributes greatly to the immediate good health of the woman, and its universal adoption would perhaps cause a marked lessening in the number of cervical cancers, though we do assuredly meet with cases in women who have never been pregnant. But the grave danger, which at present confronts us, lies in the fact that all affections of the uterus, cervical and corporeal, improve under any form of treatment commonly applied where rest and local hygienic measures are adopted. For this reason, if our diagnosis has not been sufficiently searching, the patient may escape from observation until too late to be completely cured of any malignant condition. All women share the same fear of uterine cancer, and it is to be regretted that physicians in general do not have this fear. If all would honestly refuse to treat cases of uterine hemorrhage, which would not permit the removal of a piece of indurated cervix, or would not permit a curettage for examination of the specimen, there would be a great increase in the number of cured cases of uterine cancer. Our present hope lies entirely in the honest treatment of these cases, and thus is almost wholly in the hands of our profession. It will continue to be difficult to educate the laity, when they can readily find so many men willing to give them so-called "treatments" for abnormal uterine blood-losses, without having exhausted all the well-recognized diagnostic measures.

Concerning the larger benign growths little need be said, for their tendency to cause severe complications and to undergo necrotic and degenerative changes and to produce pressure-symptoms has caused them to be regarded with so much disfavor, that the profession has almost unanimously agreed to advocate their removal, as soon as the patient will consent.

Hemorrhages during and after the menopause.—Here we may properly consider the above-mentioned idiopathic menorrhagias and metror-

rhagias, and in them we meet with our greatest difficulties in diagnosis. These perplexities arise from the facts that malignant changes are more common at this period, and that we do not find uniformity in the establishment of the menopause. Good observers have declared that all hemorrhages after the menopause are due to malignancy, and, to the clinician of hospital cases, this seems a truism, but we all have recorded cases of women, who have recurrences of an apparently normal menstrual flow, appearing at intervals, during the two years following the gradual cessation of menstruation. Again we have cases of women, suffering an excessive loss of what is apparently menstrual blood, and, in both these classes, there are no malignant changes, and indeed often the most careful search reveals no gross local or constitutional lesion. It is not necessary, at this time, to discuss the various theories of the causation of this condition but, rather, to emphasize the fact that cases of true idiopathic menorrhagia, occurring at the time of the menopause, are comparatively unusual. We know that the laity still believe, as did the medical world, twenty years ago, that such manifestations are not worthy of much comment. Duff was probably the first of writers to combat this opinion, with the absolute proof of his statistics, when he showed that, of 482 women free from pelvic disease, 39, or 8 per cent only, gave a history of unusual blood-loss, while only five of these had a marked menorrhagia. On the whole it must be safe to assert that we find a great number of advanced cancers of the uterus, because the idea of the bloody menopause does not awaken fear in the minds of the laity and of the profession.

In conclusion:

1. Of all cases of uterine cancer, received at the St. Louis Skin and Cancer Hospital, occurring during menstrual life, only one gave no history of menorrhagia or metrorrhagia as the first symptom.
2. Of all cases occurring after the menopause, 67 per cent. gave a history of blood-loss, as the first symptom.
3. Any abnormal uterine blood-loss, occurring at any age, should demand as rigid an investigation for the discovery of a possible cancer, as any cough demands for the discovery of a possible tuberculosis.

SOME THOUGHTS ON ARTIFICIAL INFANT FEEDING, WITH
SPECIAL REFERENCE TO THE DANGER
OF DEFICIENT PROTEIDS.

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Ever since, by reason of the unfortunate decrease in maternal nursing, the ingenuity of physicians has been tried to discover a suitable substitute for the human breast in the nourishment of infants, the proteids, or casein, of cow's milk has been considered the element most difficult of digestion. As a consequence, the numerous methods and devices for the modification of cow's milk have had, as a rule, the alteration or attenuation of the casein as their chief aim. This has been the reason for the dilution with water, gruels or lime-water; predigestion; the addition of whey or cream; the removal of part of the casein by precipitation; and other methods too numerous to mention. In recent years, however, the indigestibility of the casein has been seriously questioned by many, and totally denied by others,—notably by Finkelstein, Czerny, Keller, and their followers,—who insist that it is the fat which is the offending element in cow's milk; while the casein is easy of digestion, and never causes disturbance or undergoes decomposition,—the foul-smelling stools, usually attributed to it, being due to putrefaction of mucous and intestinal secretions.

The idea that the casein was injurious arose from the presence, in the stools of infants taking cow's milk, of masses or curds, which were supposed to be undigested casein, but which, in reality, in the majority of cases, are composed of fat in the form of fatty acids and soaps. It is not my purpose, at this time, to discuss the nature of the curds in the infant's stool, or whether casein is injurious or not,—questions about which much warfare has been waged recently. Suffice it to say that there is little doubt that the majority of curds encountered in infants' stools are fatty in their nature; although casein curds do occur, but much less frequently than the former. The former are soft, yellow, and easily broken up; the latter, large, tough, light in color, bean-like in shape, and not readily disintegrated. The idea that the casein is the harmless element in cow's milk is quite at variance with the views hitherto prevalent in this country and elsewhere; and, although Finkelstein's contention has not been absolutely proven, there is considerable evidence to support his conception of the harmlessness of casein and the indigestibility of cow's-milk fat

by the infant. My own clinical experience has certainly taught me that most of the trouble experienced by infants in digesting cow's milk is due to its fat, and this is specially true in those over six months of age. .

The conception that casein is indigestible led to the American system of percentage-feeding, so convenient and so useful in adapting the different elements of cow's milk to the various nutritive needs of the infant; and it is this conception, also, that has led, and continues to lead, many physicians to underfeed, and sometimes to overfeed, not only as regards the proteids, but also with the other elements of cow's milk. The great importance of proteid, or nitrogen, to growing infants must always be kept in mind in their artificial nourishment. This element repairs the waste consequent upon the wear and tear of the tissues and of the body substances, and is stored up to meet the demands of the rapidly growing organism; it also supplies heat and energy to the body, but only in slight degree in infants, this being effected by the carbohydrates (Meara). Infants fed upon mixtures in which the proteids are kept low, because of weak digestive powers, are apt to suffer materially. Such are usually under weight and anemic, with feeble circulation, weak digestion and flabby muscles, and exhibit other evidences of malnutrition. Rickets may develop from this cause; so, also, may scurvy, an affection closely allied to the former nutritional disorder; for I am convinced that it is not alone the lack of freshness in the food that is the cause of infantile scurvy; in sufficient food, particularly insufficient proteids, playing an important rôle. This is one of the reasons why condensed milk, so lacking in fat, and specially in proteids, is so potent in provoking this disorder.

As already stated, it is the idea of the indigestibility of the casein that has led to the practice, so often encountered, of keeping infants for long periods on low proteids, or feeding with proprietary foods deficient in this element, simply because of curds in the stools or of other signs of indigestion, but it is a dangerous procedure, and often leaves an impression upon the system that may handicap the individual for life. Many instances of infantile atrophy, malnutrition and difficult feeding have their origin, not so much in high proteids in the beginning, as in high fat. Of course, it is a wise and safe practice to begin with low proteids (.50 to .75 per cent.) to speak in percentages, *i. e.*, a dilution of from $1/7$ to $1/5$; but the fat should also be low, and should not in the earlier weeks exceed 1 or 1.5 per cent. Indeed, in many cases better results are obtained if the fat is about equal to the proteids, *e. g.*, in simple dilutions of whole milk. The proteids may then be slowly increased until they reach 2 per cent. at five or six months, and 3.50 per cent. at one year. The fat may also be gradually increased; but should never, in my opinion exceed 3 per cent. until the proteids reach 2.7 per cent. Signs of fat-indigestion (vomiting, soft curds in all the stools, obstinate constipation or diarrhea) at once call for a reduction in this element—often to a level with, or below, the proteids. Especially in summer is this imperative; indeed, many of the

fermental and dyspeptic diarrheas of this season may be promptly relieved, after a day or two of cereal gruels, by fat-free and fat-poor mixtures, *e. g.*, by feeding, first, with whey or skimmed milk; and then, with simple dilutions of whole milk, followed by a cautious increase of the fat up to or below the amount taken before the illness began. After the fifth or sixth month, high-proteid mixtures are better borne than in early infancy; but there is a corresponding difficulty in managing the fat—much more so than in the earlier months. Hence, at this age it is advisable and safe, specially in summer, to keep the fat on a level with, or but a little above, the proteids (with 2.50 per cent. proteids, 2.8 or 3 per cent. fat).

At this period, also, *and at all ages*, it is a great mistake to feed low proteids simply because curds appear in the stools. One occasionally sees infants of ten, twelve, or fourteen months taking 4 per cent. fat and from 1.50 to 2.50 per cent. proteids. (I speak in percentages, because of their convenience.) Such infants always present, in their nutrition, evidences, slight though they may be, of the evils of proteid-insufficiency, and relatively high fats. Illustrative of this point is the case of Baby B., thirteen months old, taking 4.25 per cent. fat and 2 per cent. proteids; sleeping and eating well; weight, eighteen pounds; but anemic, flabby, constipated, and subject to night sweats. Improvement in weight and general symptoms, specially the constipation, followed the increase of proteids to 3 per cent. and the reduction of fat to 3.33 per cent., succeeded by a rapid advance to whole milk. Similar to the foregoing is the case of Baby D., *act.* six months; flabby, anemic, rachitic, and constipated; weight, twelve pounds; taking 2.75 per cent. fat and only 1 per cent. proteids. A gradual increase of the proteids to 3 per cent., and of the fat to the same level, resulted in the accession of one pound to the weight in three weeks.

A point never to be forgotten is that an infant may suffer from proteid insufficiency, although of normal, and even of overweight. Increasing weight, indeed, often with constipation, is quite frequently one of the earliest indications of rickets. The weight, it must be remembered, is only one of the factors in the problem of nutrition. Illustrating this is Baby R., *act.* ten months, weighing twenty-two pounds and twelve ounces (three pounds above the average); muscles flabby; slight beading of the ribs; six teeth; had been weaned six weeks previously, and was taking 1 per cent. proteid, 4 per cent. fat, and 7 per cent. sugar. A mixture containing 1.75 per cent. proteids and 2 per cent. fat, with oatmeal as a diluent, relieved the constipation rapidly, and produced other signs of improvement. The constipation in this child was typical of fat-intolerance: *i. e.*, the stools were dry, light in color, and rolled from the napkin without soiling it. Such stools are not composed of undigested casein, as formerly supposed; but consist almost entirely of soap and fatty acids. Fat, however, may appear in the stools in other forms, *viz.*, as soft, yel-

lowish-white masses, occasionally resembling scrambled eggs; or the stools may have a greasy appearance, or may be white or greenish-white in color and have an acid odor (butyric acid). When fat indigestion assumes these characteristics, there is usually diarrhea or, at least, the stools are not constipated. Stools presenting the appearances just described, whether there be constipation or diarrhea, call for a decrease in the fat; and constipation arising from this cause may very frequently be relieved by decreasing or omitting the fat, and increasing the proteids.

Because of habit, and because of the lessened tone of the great bowel (*from low proteid-feeding*), it is often not sufficient to alter the percentages in order to relieve the constipation; but the use of oatmeal as a diluent, and of maltose and laxative drugs, must be resorted to. One thing is certain, viz.: that the mere increase of fat will not relieve constipation, indeed, increase of proteids is often more efficacious, because these infants frequently owe their constipation to deficient muscular tone. One of the dangers of high fat-feeding is the production of symptoms of acidosis, viz.: vomiting, fever, and more or less severe toxic symptoms. Many of the attacks of acute indigestion in infants and young children are of this nature, and may be very materially lessened, when they recur repeatedly, by diminishing or omitting altogether the amount of fat in the dietary.

Stationary or decreasing weight is a common symptom of proteid insufficiency; although this may happen when the fat is in excess. If the other ingredients appear to be correct and there is no gain, or actual loss in weight, increase in the proteids is indicated; and this should be done, even if *indigestion and curds are provoked or increased thereby*. Very often, indeed, these symptoms may be made to disappear by diminishing or eliminating the fat, and sometimes by decreasing the sugar; but if these measures do not have this result, the increased amount of proteid should be continued in spite of the stools, since the additional nourishment afforded by the increased nitrogenous food may so improve the digestive and assimilative powers that the curds and other signs of indigestion will gradually disappear. In a word, the character of the stools may be neglected if the infant is gaining and developing, even though slightly.

If, after a reasonable time, the weight does not increase or the infant otherwise improve, and the evidences of proteid intolerance persist, resort may be had to peptonization or to digestive tonics, such as gentian and soda, nux vomica, pancreatin and, specially, hydrochloric acid. Sometimes increase in weight and improvement generally may be attained in cases of this nature by the substitution of malt or cane-sugar for lactose, or by the addition of cereal flours in the form of decoctions of gruels, if they are not already in use. Buttermilk often answers admirably in cases of proteid insufficiency in infants who cannot digest or assimilate casein, or some or all of the elements of ordinary cow's milk. The usual indication for this preparation is fat-indigestion, but it is of great

value in those cases in which the proteids cannot be assimilated. It should always be freshly prepared, and, preferably, home-made (the commercial article is not advisable for use in infants). I have always employed it boiled, and mixed with definite quantities of wheat-flour ($\frac{1}{2}$ oz.) and cane-sugar (2 to 3 per cent.). For temporary use, and in very young infants, I have occasionally employed, with great success, the buttermilk conserve of Biedert and Selter—so-called Bu-co Buttermilk. The value of buttermilk is well shown in the case of Baby S., *aet.* fourteen months; always poorly nourished; severe enteritis in May from which he never rallied entirely; so that in September he presented the picture of profound malnutrition, viz.: emaciated, fretful, sleepless, with recurring attacks of diarrhea, alternating with constipation. Because of the disturbance it invariably excited, cow's milk had been withheld for several (four) months, the child being fed upon gruels, eggs, broths, and zwieback. The diet was at once limited to buttermilk, with a resultant gain of fifteen pounds in six months. Similar to the foregoing, was the case of Baby C., aged two years. Here the child, suffering from malnutrition following an enterocolitis, acquired a year previously, had been deprived of cow's milk for an equal length of time. As a consequence of repeated failures, the mother was very reluctant to try cow's milk in any form, but finally consented to use buttermilk—with an improvement as remarkable as in Baby S. (exact amount of gain mislaid).

I fear that these rather desultory remarks have lost much of their force from the disconnected manner in which they have been presented. Hence, a brief summary of what I have endeavored to say, will not, I think, be out of place:—I have desired to emphasize the great importance of a sufficiency of proteids in the infant's dietary; to show how frequently infants suffer from a want of this element, because of the misconception (still prevalent) that it is the casein of cow's milk which is the most injurious to, and difficult to digest by, the human baby; that this idea had its origin in the belief that the curds commonly seen in the infant's stool were undigested casein; while, in reality, in the majority of cases, they are composed of fat—although casine curds do occur; that this belief has led physicians in the past, and is still leading them, to feed babies with low proteids or upon proprietary foods deficient in this element; that fat is better tolerated before the sixth month than after, in winter than in summer, is the cause of a peculiar form of constipation, and is particularly obnoxious in all acute digestive disturbances, and may provoke a definite and often severe train of symptoms due to acidosis; that a deficiency in proteids is a common cause of malnutrition, rickets, scurvy, anemia, feeble circulatory, digestive and assimilative powers and constipation; that normal or increasing weight may occur with deficient proteids, and, with constipation, is frequently an early sign of rickets; that when these symptoms occur, the proteids should be increased, often with diminution of the fat, especially if there

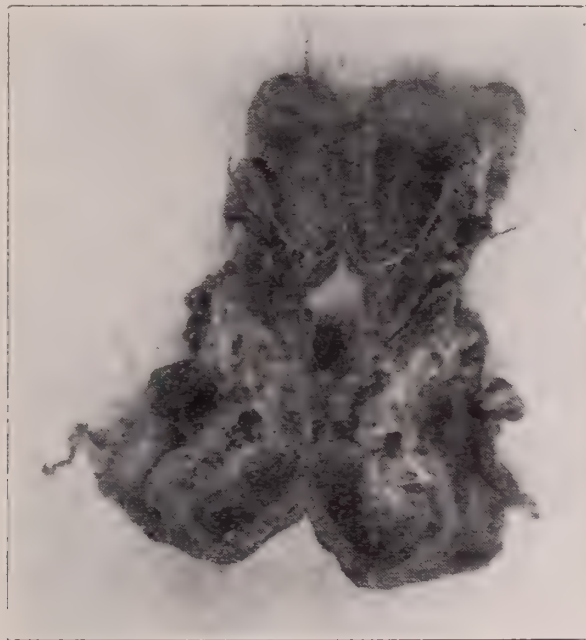
is constipation, or if there is diarrhea with fatty curds; that when increased amounts of proteids are indicated, but apparently not tolerated, even though the fat be reduced, resort should be had to peptonization and digestive tonics,—although it will repeatedly be found that perseverance in the increased proteids will frequently cause the apparent evidences of their injurious influence to disappear; that buttermilk is a convenient medium for exhibiting the proteids, when they are otherwise not well tolerated; that the stools may be practically disregarded, so long as the infant is gaining regularly and developing naturally; and, finally, as will have been observed by those who have grasped the full significance of these remarks, that simple dilutions of whole milk with cereal decoctions, and the addition of sugar, are sufficient, in very many cases, for the successful nourishment of infants.

127 South Illinois Avenue.

REPORT OF CASE AND EXHIBITION OF SPECIMEN OF UNDESCENDED TESTIS.

By CHARLES H. CHETWOOD, M. D., of New York,
Professor of Genito-Urinary Surgery, New York Polyclinic Medical School and
Hospital.

Male, aged twenty-eight years, butcher, family history negative. When patient was nine years old, while attempting to vault a post, he was impaled upon the top and subjected to the injury, on which occasion he al-



leges his testicle disappeared into the abdomen and remained there. He experienced considerable pain at the time, but was able to walk home, and was not sufficiently sick to mention the occurrence to his parents.

Two years later his father discovered the condition of the retained testicle while patient was bathing.

He suffered no pain or inconvenience during the intervening years between this accident and a second injury, which occurred January, 1910. At this time, when twenty-eight years of age, while lifting a hind quarter of beef, weighing about 200 pounds, he felt a tearing, accompanied by a sharp pain in the right inguinal region, and on examining himself, saw and felt a small tumor the size of a pigeon's egg, which caused considerable pain and discomfort when standing or walking, and a lesser degree of discomfort when at rest.

The patient was seen by me the latter part of January,* 1910, three weeks following the injury.

Examination revealed an enlargement in the right inguinal region, just external to the internal ring. The enlargement suggested a retained testicle, though harder and more globular than the normal gland. It had apparently reduced in size since the injury, and was only slightly sensitive.

The patient was quite positive in his statement that he had not been a congenital monorchid, and that his double injury was the cause of this condition.

On cutting down upon the inguinal canal, the enlargement felt from the outside was exposed and found to be attached to the spermatic cord. When traction was exerted upon the cord from the internal ring, the second enlargement presented in the specimen exhibited, which possesses more the appearance of the normal testicle than the external enlargement, was delivered from the internal abdominal ring.

Closer examination of the structure revealed that an incompletely formed testicle had been retained in the abdomen, and that the descent of the vas and epididymis had taken place, at all events, as far as the external abdominal ring, or, if the patient's statement can be taken, had descended to the scrotum, having been subjected later to dislocation backwards, as a result of direct injury.

The case, therefore, seems to be that of monorchidism, with descent of the vas and epididymis.

The examination of sections confirmed this conclusion, the distal enlargement proving to be the epididymis, with evidence of acute and chronic inflammation, and the interior portion proving to be, as it appears grossly, the body of the retained testis.

109 East 34th Street.

MEDICAL AND SURGICAL PROGRESS.

RECENT ADVANCES IN CANCER RESEARCH.

A REVIEW OF RECENT LITERATURE.

By MOYER S. FLEISHER, M. D., of St. Louis.

1. Leopold (*Archiv. fuer Gynækologic*, No. 1, Vol. 92, 1910).
2. Leopold (*Archiv. fuer Gynækologie*, No. 4, Vol. 61, 1910).
3. Sanfelice (*Zeitschr. fuer Krebsforschung*, Vol. 6, p. 166, 1907).
4. Sanfelice (*Zeitschr. fuer Krebsforschung*, Vol. 7, p. 564, 1909).
5. Lewin (*Zeitschr. fuer Krebsforschung*, Vol. 4, p. 55, 1906).
6. Galeotti and Pentimalli (*Centralb. fuer Bakter., Parasitenkunde u. Infektionskrankh.*, Vol. 55, p. 312, 1910).
7. Behla (*Der tatsæchliche Krebserreger*, Berlin, 1907).
8. Borrel (*Annales de l'Institut Pasteur*, Vol. 23, p. 97, 1909).
9. Borrel (*Annales de l'Institut Pasteur*, Vol. 24, p. 778, 1910).
10. Saul (*Centralb. fuer Bakter., Parasitenkunde u. Infektionskrankh.*, Vol. 55, p. 15, 1910).
11. Dahl (*Centralb. fuer Bakter., Parasitenkunde u. Infektionskrankh.*, Vol. 53, p. 524, 1910).
12. Reuter (*Centralb. fuer Parasitenkunde u. Infektionskrankh.*, Vol. 56, p. 339, 1910).
13. Abderhalden (*Zeitschr. fuer experim. Pathologic u. Therapie*, Vol. 2, p. 642, 1906).
14. Abderhalden and Medigreceanu (*Zeitschr. fuer Phys. Chem.*, Vol. 66, p. 69, 1910).
15. Emerson (*Archiv. fuer Klin. Med.*, Vol. 72, p. 415, 1902).
16. Blumenthal and Wolff (*Med. Klinik*, Part 1, p. 166, 1905).
17. Neuberg (*Berl. klin. Wochenschr.*, No. 5, 1905).
18. Hess and Saxl (*Zur Kenntniss der spezifischen Eigenschaften der Carzinomzelle*; Herausgegeben von Dr. Saloman, 1909).
19. Kepinow (*Zeitschr. fuer Krebsforschung*, Vol. 7, p. 517, 1909).
20. Lieblein (*Zeitschr. fuer Krebsforschung*, Vol. 9, p. 609, 1910).
21. Blumenthal, Jacoby, and Neuberg (*Med. Klinik*, No. 42, 1909).
22. Abderhalden and Rona (*Zeitschr. fuer Phys. Chem.*, Vol. 60, p. 415, 1909).
23. Abderhalden, Koelker and Medigreceanu (*Zeitschr. fuer Phys. Chem.*, Vol. 62, p. 145, 1909).
24. Abderhalden and Menligreceanu (*Zeitschr. fuer Phys. Chem.*, Vol. 64, p. 265, 1910).
25. Abderhalden and Pincussohn (*Zeitschr. fuer Phys. Chem.*, Vol. 64, p. 277, 1910).
26. Abderhalden (*Zeitschr. fuer Krebsforschung*, Vol. 9, p. 266, 1910).

27. Freund (*Biochemische Zeitschr.*, 1910).
28. Neuberg (*Biochemische Zeitschr.*, 1910).
29. Freund and Kaminer (*Wine. klin. Wochenschr.*, Vol. XXIII., p. 1221, 1910).

In the present review it will be possible to consider only a portion of the recent literature of cancer research, and therefore, we will confine ourselves here to the consideration of some recent work regarding the parasite origin of cancer and some of the advances regarding the chemistry of tumors.

Some years ago both Sanfelice and Leopold published results of experiments regarding the etiological relation of *Blastomyces* and cancer in which they showed that *Blastomyces* might be cultivated from pieces of tumor tissue.

Leopold in his first published article was able to report on the recovery of cultures of *Blastomyces* from human tumors in 4 out of 20 cases. He used as a rule, tumors which were not ulcerated; he examined pieces of tissue which were being invaded by tumor cells, thus pieces far removed from the surface and pieces in which young and actively growing cells were present. In every case all aseptic precautions were followed and the possibilities of accidental infection were reduced to a minimum.

In his later work he reports on additional experiments to obtain cultures of *Blastomyces* from human tumors. Including his earlier experiments he now reports on 64 cases. In 37 cases he obtained cultures of *Blastomyces*; in 13 *Blastomyces* were demonstrated only in a hanging drop and in 14 no *Blastomyces* were found. It is interesting to note that in his last series of 23 cases he was able to find *Blastomyces* in all but one.

In 11 cases in which he placed in the cultural media pieces of tissue not taken from malignant neoplasms (5 of these were myomata of the uterus) his results were negative.

In tabulating his results he does not state definitely in all cases whether or not his cultures of *Blastomyces* were contaminated at first. However, it is evident that in 20 of these cases in which he obtained cultures of *Blastomyces*, these were at first contaminated, and in only 10 cases did he obtain pure cultures of *Blastomyces*. 13 other cases seem to have been contaminated, but in this respect his reports are not sufficiently definite to permit any certain statement. However, it is apparent that in the majority of cases, Leopold was not dealing with a pure culture of *Blastomyces*; whether the bacterial contamination was accidental or whether it arose from organisms present in the tissue cannot be stated.

Sanfelice in his later work, has confined himself almost entirely to the experimental production of tumors by the inoculation of *Blastomyces*; he also reported, however, on the isolation of a culture from a tumor of a dog (lympho-sarcoma), and this culture he used in a number of his experiments. In his experiments he used, dogs, cats, and rats as experimental subjects.

When the *Blastomyces* alone were injected, no true neoplasm resulted; a tumor was noted composed chiefly of the organisms which had proliferated *in situ*. If, however, *Blastomyces* and their toxins or their toxins alone were injected, tumors were noted which Sanfelice considered to be true neoplasms. The general features of these tumors were similar in the various experimental animals. He considered a large mass,

usually noted in the great omentum, as the primary tumor, and the collection of cells noted in the liver, spleen, lymph-nodes, kidney, and lungs, as metastases; also other smaller tumors in the peritoneal cavity, Sanfelice thought to be due to the loosening of cells from the original tumor mass in the omentum, thus metastases by wandering of cells in the body cavity.

He also reports the production of an adenocarcinoma of the breast in a bitch as the result of an injection of the toxins of *Blastomyces* into the subcutaneous tissue near the breast, but gives no description of this tumor. The injection of *Blastomyces* into the præputium of dogs led to the formation of a tumor which Sanfelice classes as a sarcoma, considering it to be a tumor similar to the transplantable lymphosarcoma of dogs. He has transplanted thirteen of the above-mentioned peritoneal tumors of rats, which had been produced by the intraperitoneal injections of *Blastomyces* into other rats, and has been able to carry these transplantations through three to five generations; the tumor remained true to its original type in all cases.

As a result of these experiments, Sanfelice was led to believe that the *Blastomyces* stood in etiological relation to neoplasms, and he therefore attempted to obtain a serum which would contain antibodies for both *Blastomyces* and their toxins, and with which he might combat these neoplasms. He prepared a serum which protected a rat from the injection of a lethal dose of *Blastomyces* and their toxins. He believed that this antiserum contained substances which destroyed the organisms and neutralized their toxins. He treated eleven dogs which showed spontaneous tumors with this antiserum, and was able to cure ten, and note a marked reduction in the size of the tumor of the other dog, which died of intercurrent disease.

The tumors which apparently resulted from the injection of *Blastomyces*, Sanfelice considers as true neoplasms, but both the microphotographs and the descriptions of the tumors show many similarities to tumors produced by foreign bodies. The tumors produced by the injection of *Blastomyces* contain giant cells, and are composed of large endothelial cells; the so-called metastases appear most frequently in places where lymphatic tissue pre-exists.

Sanfelice advances the theory that *Blastomyces* and their toxins, especially the latter (since injection of a large quantity of the organisms alone leads only to a general infection), stimulate cells to proliferation, cause a change in form and function (anaplasia), and thus change the chemism of the cells. When these cells are carried to parts of the body distant from the original site, they retain the power of unlimited proliferation, and thus constitute true metastases. The *Blastomyces* remain in the cells of the original tumors but are present in a changed form; they continue to produce toxins which act upon the cells. He draws an analogy between this action of the *Blastomyces* and "experimental intoxication" with the products of bacteria.

Leopold does not reach as definite conclusions as does Sanfelice, but he considers the *Blastomyces* as at least one of the etiological factors in the production of neoplasms.

Galeotti and Pentimalli have inoculated into dogs and rats cultures and toxins of *Blastomyces*. They were not able to produce tumors when sterile cultures were injected, but the cell contents of the *Blastomyces* (obtained by crushing the cells and expressing the juice under hydraulic pressure) produced new growths if not freed from all *Blastomyces*. Injection of either the nucleo-proteids or the autolytic products of the

Blastomyces led to the information of tumors. The tumors in rats Galeotti and Pentimalli class as adenomata, simple epithelial proliferations and in two cases as carcinoma. In dogs they produced lymphangioendotheliomata and sarcomata and in one case an adenoma. They conclude from their results that the endotoxins of Blastomyces cause metaplasias and compare this cell proliferation at least in a degree with the local metaplasias produced by the injection of Scharlach R. and other substances. The reactions which Galeotti and Pentimalli noted were however distant from the site of injection and furthermore they claim to have demonstrated metastases in one experiment. They withhold their opinion as to the relationship between Blastomyces and malignant neoplasms.

In connection with the theory of a parasitic origin of neoplasms some experiments which Lewin carried out some years ago appear to be of interest. He transplanted pieces of an ovarian carcinoma removed from a human, into the peritoneal cavity of a dog and obtained tumors which were in no way distinguishable from the usual foreign body granuloma. When these tumors from the peritoneal cavity of the first dog were transplanted into other dogs, a tumor developed differing somewhat from that noted in the first dog. This second tumor was transplanted through four more generations. Lewin considered this tumor noted in the later generations to be a sarcoma, but it seems doubtful whether these later tumors were not granulomata like the first one.

Lewin is rather guarded in his conclusions but suggests the probability that some agent present in the human ovarian carcinoma was inoculated with the tumor substance into the first dog, and from this animal into the other ones. This agent he thinks, must have been the causative factor in the production of the so-called sarcomas.

Behla, who supports the theory of the parasitic origin of cancer, believes that the tumors which Sanfelice and Leopold noted following the injection of Blastomyces were granulomata. He also believes that the recovery of Blastomyces from human tumors was due to accidental infection of the tumors.

Another theory of the parasitic origin of tumors which has developed recently, connects acari and neoplasms.

In a series of twenty-two tumors (most of them early epitheliomata), Borrel has shown that acari which he classes as *Demodex*, a common house mite, may be found in the tumor or in close relationship with the tumor. Almost all these tumors were removed from hospital patients, that is patients of the poorer classes. Borrel believed that the acari represented the intermediate hosts of the true cancer parasite and thus explained why acari were found only in early tumors, believing that they died and disappeared after inoculating the true cancer parasite.

Saul, spurred on by Borrel, found in tumors from human beings, mice, dogs and horses, acari which differed from those found by Borrel and which Saul considered to be a new species of *Tarsomenus*. These acari were found not in early but in large well-advanced tumors. Dahl, who studied the acari which Saul found, shows that the *Tarsomeni* are of the same class as the acari which produce gall or tumors in trees. Both Saul and Dahl incline toward the belief that these acari may be the causative agents of cancer and think that their action in this respect is not due to mechanical irritation, but to some product of the adult parasite or of the ova deposited by the adult. They suggest that the reason that acari have not been found before is due to the presence of the ova alone, and the disappearance of the adults from the living tumor.

This interpretation by Saul and Dahl of their observations is attacked by Reuter, who claims to have proved by experiment that it is impossible to prevent mites from entering jars closed in the usual manner (Saul had found the Tarsomeni in old tumor material which had been preserved several years), and also points out that the bodies which Saul and Dahl considered as ova, were much smaller than the usual ova of Tarsomeni. Saul and Dahl had laid much stress upon the fact that one and possibly two new varieties of Tarsomeni had been found in the tumors, believing that this pointed toward these acari, being the causative agents of cancer.

Reuter shows that although considerable work has been done in classifying Tarsomeni, still new varieties are being found constantly, and that the discovery of a new variety in tumors is therefore not very astonishing.

* * * * *

For many years attempts have been made to demonstrate differences between the proteids of normal cells and tumor cells. As yet no such differences had been demonstrated. Abderhalden has shown that tumors contain more glutaminic acid than do normal tissues, but he calls attention to the fact that this demonstrates no specific cancer proteid, but may be due to a difference in the relative quantities of various proteids in the tumors. Abderhalden and Medigreceanu have compared the tyrosin, glutaminic acid and glycocoll contents of tumors from various animals (cow, rat and mouse), but were not able to show differences in their relative contents of these substances.

The enzymes of the tumor cells have been actively investigated and Neuberg, Emerson, Blumenthal and Wolff, claimed that when cancer tissue and normal tissue were allowed to undergo autolysis in a mixture, more incoagulable nitrogen containing substances were produced, than when cancer tissue and normal tissue were autolysed separately. It was also claimed that cancer tissue caused a more rapid splitting of proteids than does normal tissue.

Hess and Saxl on the other hand, were unable to show that cancer tissue showed more active proteolytic action than normal tissue, nor were they able to show that more incoagulable proteids were produced when cancer tissue and normal tissue were allowed to autolyse together than when allowed to autolyse separately. On the contrary, they found that the actual incoagulable nitrogen bearing substances noted in the autolysed mixtures were usually smaller in quantity than should have been found according to their computations. They were not able to confirm Neuberg's results regarding the finding of smaller quantities of the substances formed by the splitting of the albumoses when cancer tissue and normal tissue were allowed to autolyse together than when two normal tissues autolysed separately.

Kepinow and Lieblein have both confirmed the results of Hess and Saxl, and found the non-coagulable nitrogen containing substances produced by combined autolysis of cancer and normal tissue to be less than when such tissues were autolysed separately.

Blumenthal, Jacoby and Neuberg have, however, in further experiments, obtained results similar to their first ones; they find that this difference between the combined autolysis of tumor tissue and normal tissue and the combined autolysis of two normal tissues exists only in certain tumors so that this divergence between their results and those of Hess and Saxl may be due to the kind of tumors used.

Abderhalden and Rona have been able to find no difference between

the splitting action of adenomatous tumors and normal tissue upon a proteid. They found, however, that scirrhus cancer had no splitting action whatsoever.

On the other hand, Abderhalden, Koelker, and Medigreceanu found that juices of cellular cancers (expressed by hydraulic pressure), acted more rapidly upon higher proteids than did similar fluids from normal cells.

Abderhalden and Medigreceanu who used optically active albuminous products in their experiments noted that the ferments of tumors occasionally acted differently on a certain kind of peptone than did the ferments of normal tissues. They were not able to demonstrate any connection between the rate of growth of the tumor and its proteolytic activity.

Abderhalden and Pincussohn showed that when d.-alanyl-glygyl-glycin was acted on by the ferments of tumor cells it was hydrolysed in a distinctly different manner by certain tumors than when acted on by the ferments of normal tissues. The splitting of this substance produced different intermediate products in the two cases.

Abderhalden contends that this difference in the enzymes of tumor cells, points to a difference in the entire chemical structure of tumor cells and that the metabolism of tumor cells must therefore be different from that of normal cells. He suggests that the abnormal catabolic products of these cells may be toxic to normal body cells. The abnormal ferments may also cause changes in distant cells while the relations between various groups of cells or organs (as expressed by hormones or activators), may be interfered with by these abnormal ferments. Such changes, he suggests, may give rise to the cachexia of cancer cases.

Finally, we shall consider certain relations which have been shown to exist between the serum of cancerous and non-cancerous individuals and cancer cells.

Freund has found that there is in the blood of non-cancerous individuals, a substance which causes lysis of cancer cells, but which has no effect on cells of organs from cancerous or non-cancerous individuals. The blood of cancerous individuals does not destroy either cancer cells or cells of organs, but the addition of blood of cancerous individuals to the blood of non-cancerous individuals prevents the lytic action of the latter upon the cancer cells. The first substance is contained in the euglobulin fraction of the serum; the protecting substance is carried by a substance similar to nucleoglobin. Neuberg working independant in somewhat different manner has come to very much the same results as does Freund.

When some of the cell-destroying fraction of non-cancerous serum was added to cancerous serum Freund and Kaminer found that they recovered less than the calculated amount of the euglobulin fraction (the bearer of the lytic substances), and therefore concluded that the protecting substance in cancerous serum destroys the lytic substance of non-cancerous serum.

Freund has noted that when serum of cancerous individuals was added to cancer extract a cloudiness was produced; hence, Freund and Kaminer extended their experiments regarding the production of this cloudiness and found that it was cleared by addition of serum of non-cancerous individuals. They further tested the reaction of cancer extracts with sera in fifty-four cancerous individuals and in forty-five non-cancerous individuals; and since their results were constant (cloudiness produced in all of the first cases and none produced in the latter), they concluded that this reaction is specific for cancer.

THE MEIOSTAGMIN REACTION.*

A REVIEW OF RECENT LITERATURE.**

By LEO A. JUHNKE, M. D., of Chicago.

1. (*Muench. med. Wochenschr.*, Nos. 4, 8, 16, 18, 21, 22, 29, 32, 41, 1910.)
2. (*Berliner klin. Wochenschr.*, Nos. 19, 23, 32, 44, 1910.)
3. (*Wiener klin. Wochenschr.*, Nos. 27, 30, 33, 1910.)
4. (*Wiener med. Wochenschr.*, No. 26, 1910.)
5. (*Medizinische Klinik*, No. 29, 1910.)
6. (*Deutsche med. Wochenschr.*, No. 43, 1910.)
7. (*Zeitschr. fuer Immunitätsforschung*, Vol. 6-7, No. 1, 1910.)
8. (*Biochemische Zeitschr.*, Vol. 28, No. 1; Vol. 29, Nos. 1, 2, 3; 1910.)
9. (*Zeitschr. fuer Infektionskrank. der Haustiere*, 1910.)
10. (*Pathologia*, Nos. 32, 39, 43, 1910.)
11. (*Il Policlinico*, No. 25, 1910.)
12. (*Biochemica e terapia sperimentale*, No. 11, 1910.)
13. (*Societa med.-chir. Pavia*, No. 1, 1910.)
13. (*Corriere Sanitario*, No. 18, 1910.)
14. (*Accademie med. di Padova*, June, 1910.)
15. (*Societa medico biologica Milanese*, June, 1910.)

Since decreased surface tension has been observed as a frequent accompaniment to immunity reactions, Ascoli and Izar, of the University of Pavia, more lately of Catania, Italy, decided to investigate the phenomenon, and from their investigations resulted the Meiostagmin reaction. The principle of the reaction is based upon the fact that when a specific antigen is added to a specific serum, a lowering of the surface tension of the serum results. There are various ways of determining the surface tension of a liquid, but all experiments until recently have been conducted with the drop method, using Traube's stalagmometer.

Serum of a typhoid patient (typhoid because the reaction was first tried in typhoid fever) and normal serum for control are diluted with normal salt solution in proportion of 1-20, this having been found convenient to work with. The antigen is an alcoholic extract of typhoid bacilli prepared according to the method of Neisser and Shiga, diluted with normal salt solution in proportion of 1:25, 1:50, 1:100, 1:500, the degree of dilution varying with the strength of the antigen used.

The reaction is as follows:—

To 9 c.c. of the 1:20 diluted typhoid serum is added 1 c.c. of diluted antigen (its strength having been previously determined).

*Read before the Michael Reese Hospital Clinical Society, December 9th, 1910.

**So many references have been consulted in this review that too much space would be utilized in presenting them individually. Consequently they are grouped for convenience under the journals in which they appeared.

To 9 c.c. of the 1:20 diluted normal serum is added 1 c.c. of the same antigen.

To 9 c.c. of each of the diluted sera is added 1 c.c. of normal salt solution for control. See table.

9 c.c. of 1-20 diluted Typhoid Serum	NUMBER OF DROPS Typhoid Serum		9 c.c. of 1-20 diluted Normal Serum	NUMBER OF DROPS Normal Serum	
	Before Incubation	After 2 hours' Incubation		Before Incubation	After 2 hours' Incubation
Plus 1 c.c. Typhoid Antigen diluted 1-100	{ 58.0 58.1	61.2 61.2	Plus 1 c.c. of 1-20 diluted antigen	57.0 57.1	58.0 58.1
Plus 1 c.c. .85% Salt Solution	{ 57.0 57.1	58.0 58.0	Plus 1 c.c. .85% Salt Solution	57.1 57.2	58.0 58.1

The surface tension of each of the four liquids is tested immediately. They are put in an incubator at 37° C. for two hours, thus allowing antigen and typhoid serum to combine. At the end of two hours they are removed from incubator, cooled to room temperature and the surface tension is again determined.

It has been shown that if antibody is present in the serum and binds the antigen, the surface tension of that serum is decreased and a greater number of drops is contained in a given volume of serum when measured by this method. The antigen can be used in varying strength and reacts positive even in high dilution. By using too strong solutions it is possible to bring about a decrease in the surface tension merely by the liquid with which the antigen is extracted. Hence a previously titrated strength of antigen is used and, as is evident, the one which gives the greatest differences between the reaction and the control is the most desirable one to use.

The differences are small, 1 to 3 drops in some cases, whereas in other cases even up to 8 drops, but sufficiently decisive to enable one to read a positive reaction easily. Arbitrarily Ascoli and his associates have set a limit beyond which a reaction must go before it is considered positive, and they required a difference of 2 drops for a positive reaction, to exclude errors of technique. More recently Ascoli has tried different methods of increasing the intensity of the reaction and of making readings doubly certain. By trying numerous chemicals he found that a certain amount of dilute acetic acid or methyl alcohol, when added to the sera, increased the intensity of the positive reaction several times, whereas it had no effect upon the controls.

The reaction probably occurs in every disease in which an antigen of the etiological factor of the disease can be obtained, therefore in every infectious disease of known bacteriological cause, of parasitic diseases, etc. It also occurs in cases of malignant tumors, here using an antigen made of tumor extract. It seems to be a specific one needing for its taking place on the one hand the antibody, here named "meiostagmin," produced in the patient in the course of the disease, and on the other hand the specific antigen. That the specific antigen in any given case

alone will bring about this reaction and no other, has been demonstrated conclusively. Furthermore the enormous dilutions in which an antigen may be used in certain cases and still give positive results speaks similarly for that fact. Thus in testing out a strongly typhoid immunized horse serum Izar obtained a positive reaction with dilutions of antigen up to 1 in 100,000,000. To further prove the specificity of the reaction and to show that the meiotagmin bodies are anchored only to their specific antigen Ascoli successfully tried the well-known binding experiments. Gosharrin went further to test its specificity. He injected three types of tubercle bacilli—human, avian and bovine—into different guinea-pigs to determine whether specific meiotagmin bodies were produced in these animals. The respective disease was produced in each of the guinea-pigs; as was later confirmed by autopsy findings and it was shown that the meiotagmin reaction was specific for the type of bacillus injected.

Although the reaction was first tried in typhoid fever no series of cases is reported by the experimenters, as their first investigations were not directed so much to prove its specificity as they were to perfect the technique. But since then their results have been verified by Vigano, who tried the reaction in 6 cases of typhoid fever in which agglutination tests for typhoid bacilli were positive in dilutions of 1 to 100 and negative for paratyphoid A and B. In all of these cases the meiotagmin reaction was correspondingly positive to typhoid antigen and negative to paratyphoid A and B, again showing its specificity. Later Izar has reported another small series of cases, 9 in number, in which the reaction was decidedly positive, whereas in 18 other diseases not typhoid, but in which typhoid antigen was used, all were negative.

Izar investigated the reaction in syphilis. As an antigen he used an alcoholic ethereal splenic extract from a syphilitic fetus, prepared according to certain directions. He tried the reaction in a series of 90 clinically positive cases of syphilis, these in all three active types of the disease, as well as in the latent state. The reaction was positive in about 90 per cent. of cases clinically positive syphilis, a good percentage of them in the latent state. Of the 18 clinically suspicious cases, the Wassermann was positive in 6 instances, and the meiotagmin positive in each of these. Out of the 12 negative Wassermann cases there were 4 meiotagmin positive; in 8 of these cases both reactions were negative. To test the specificity of the reaction for syphilis the writer reported 104 various non-syphilitic diseases in which the reaction was tried with syphilitic antigen. Only in one of these 104 cases was the reaction actually positive, this being a case of erythema nodosum, whether or not on a syphilitic basis is not known.

Izar also tested the reaction in a series of 40 clinically positive cases of tuberculosis of the lungs. In 35 of these cases the tubercle bacillus was found microscopically. In all but one case was the meiotagmin reaction positive. In 5 other cases in which the Pirquet was positive, but in which no bacilli were found, the meiotagmin reaction was positive in each case. No explanation is offered for the one in which it was negative. As these were the first experiments with tuberculous sera, the cases selected were perhaps too far advanced to consider the value of the reaction in beginning tuberculosis, or to estimate how early a reaction can be obtained after infection. Gosharrin proved that in guinea pigs and rabbits experimentally infected with tubercle bacilli the reaction was positive as early as the fifth day after inoculation. Izar tested the reaction

with tuberculous antigen in 74 non-tuberculous diseases as a control, and in each case was the reaction negative. DeEste, of Milan, has investigated the reaction in 15 cases of surgical tuberculosis controlled by positive ophthalmic reactions, by Pirquet reaction as well as by operative findings, and found it positive in every case. He also tried the reaction in advanced tuberculosis of the lungs and in each case was the reaction positive, however with greater intensity than in the surgical cases.

From the analysis of these two series we can conclude that the reaction is positive only in active foci—the more active the focus, the more intense the reaction. It leaves out the latent cases but therefore of so much more significance is a positive reaction.

The reaction has also been tried in 6 cases of anchylostoma duodenale, and in each case was the blood serum meiostagmin positive, whereas in 20 control cases in which anchylostoma antigen was used, the reaction was negative each time. Among the controls were two cases of anguillula intestinalis in which the reaction was negative to anchylostoma antigen. In echinococcus disease, of which Izar had eleven cases, all in household animals, the reaction was positive in each; in 7 cases of healthy animals the serum reacted negative to echinococcus antigen.

Perhaps the greatest value of the reaction lies in the fact that it is positive in cases of malignant tumors. Ascoli's interesting results with a transplantable rat sarcoma, led him to try the reaction immediately on malignant tumors of the human, using an antigen made of malignant tumor extract. His present method of making an antigen is as follows:—

The tumor, preferably the undegenerated portion of it is cut into fine slices or ground to pieces. It is spread out on glass plates in a very thin layer and dried in a temperature of 37° C. The dried residue is powdered and extracted with methyl alcohol in proportion of 5 gm. to 25 c.cm., put in a closed vessel and kept for 24 hours at a temperature of 50° C., shaking occasionally. It is then filtered hot, cooled to room temperature and filtered. This process can be repeated several times, each for 24 hours at a temperature of 50° C. The final residue is then dried again, powdered and extracted with ether under the same conditions. The filtered extracts are evaporated and the residue dissolved in the smallest amount of methyl alcohol and may be kept as such.

Titration of the antigen. The antigen is now titrated to determine its strength. Dilutions of 1 to 25, 1 to 50, 1 to 100, 1 to 200, 1 to 1000, etc., are made, using normal salt solution as the diluent. One c.c. of each of the respective antigens is added to 9 c.c. of 1/20 diluted normal serum and incubated for two hours. Surface tension of the mixtures are taken before and after incubation. The most desirable antigen is that one which after 2 hours' incubation gives a difference in the reading not greater than one drop.

In Ascoli's first series of 30 cases, 28 of which were carcinomata of stomach, uterus, mammæ, etc., 5 of which were still operable, 1 of 4 months standing, the reaction was positive in 29 out of the 30 cases. In 28 non-malignant diseases, including a few non-malignant new-growths the reaction was negative each time. Of interest here is the fact that serum from a carcinomatous patient gave positive meiostagmin reactions with sarcomatous antigen and vice versa—suggesting a fact which seems to conform to the views of modern pathologists and surgeons that there is less difference between sarcomata and carcinomata than hitherto supposed.

DeEste's series of 12 cases of malignant tumors all gave a positive meiostagmin reaction, whereas 10 cases of non-malignant tumors as lipomata, fibromata, goitres, etc., as well as 8 other surgical diseases were meiostagmin negative when tested with malignant tumor antigen.

Micheli and Cattorette shortly after reported 18 cases of malignant tumors in 17 of which a positive reaction was obtained. The same

writers later report a series of 50 clinically malignant cases with a positive reaction in 90 per cent. Of the doubtful cases the reaction usually corresponded to the histological findings obtained either at operation or at necropsy. In no instance was the reaction positive in another disease, although it was tried in a fairly large number of cases by these writers. In 6 cases of leukemia tested with malignant tumor antigen a negative reaction was obtained each time.

In his second series of malignant tumor cases, 100 in all, Ascoli obtained a positive reaction in 93 per cent. Of these cases 16 were still operable, showing that the reaction is positive fairly early in the course of the disease. He designates 4 of these as early malignant tumors of 3 to 4 months standing. Of the 7 negative cases 2 were epitheliomata of the skin, 2 sarcomata of the skin, 1 a recurrent carcinoma of the mammae, 1 a sarcoma of the popliteal space, and 1 an abdominal tumor of unknown description. In 40 cases of this series two antigens were used, one obtained from a rat sarcoma and the other prepared from a malignant tumor of the human. The reactions in which the human tumor antigen was used were much more positive, that is, they showed a greater difference between the reaction and the controls. In some cases this difference was as high as 10 drops, showing that the reaction is not so delicate, but decidedly positive. For controls to this series Ascoli tried the same antigen in 103 non-malignant diseases of various nature, and out of these only one reacted positive. This was a case of nephrolithiasis, in which a nephrectomy was done, and in which the microscopical examination revealed no malignant growth. The case is being investigated further to determine cause of the positive reaction.

De Angostini, of Milan, in a series of 27 malignant cases obtained a positive reaction in 85 per cent., but explains several negative cases as being negative perhaps because of faulty technique, thus lowering his percentage. Of the 27 controls in non-malignant cases every one reacted meiostagmin negative.

Stabilini, from Tausini's surgical clinic at Pavia, reports 32 cases of positive malignant tumors in which he obtained a positive reaction in 30 cases, approximately 94 per cent. In 49 control cases, which included 20 benign tumors, the reaction was negative in all.

SUMMARY.

The reaction is positive in malignancy in from 85 to 95 per cent. of cases. Of its specificity there can be no question, only one case being reported in which the reaction was positive, after repeated trials, although the disease so far as can be determined is not malignant. As the individual is still living the case remains unsettled. As much or more can be said for the reaction in infectious diseases. No positive reaction was obtained with a specific antigen except in cases bacteriologically corresponding to the antigen.

The time of appearance of a positive reaction remains to be studied further. Though relatively early in the acute infections it is in tuberculosis that its early appearance is of value. As was stated above it appeared in experimentally infected animals as early as the fifth day.

It is in the early appearance of the reaction in malignant tumors wherein its greatest value will lie. This also remains to be studied further, although some important data are already on hand. Thus Ascoli reports it positive in 16 cases of operable carcinomas out of 100 malignant cases. Out of these 4 were early cases, in the third or fourth month of the disease.

GASTRIC ULCER: X-RAY DIAGNOSIS.

A REVIEW OF RECENT LITERATURE.

By E. H. SKINNER, M. D., of Kansas City.

1. Rieder: Das chronische Magengeschwuer und sein roentgenologischer Nachweis. (*Muench. med. Wochenschr.*, Vol., 57, No. 48, Nov. 29th, 1910.)
2. Faulhaber: Zur Roentgendiagnostik des tiefgreifenden (kalloesen) Ulcus ventriculi. (*Muench. med. Wochenschr.*, Vol. 57, No. 40, Oct. 4th, 1910.)
3. Haudek: Zur roentgenologischen Diagnose der Ulzerationen in der Pars media des magens. (*Muench. med. Wochenschr.*, Vol. 57, No. 30, July 26th, 1910.)
4. Haudek: Die Roentgendiagnose des kalloesen (penetrierenden) Magengeschwuers und ihre Bedeutung. (*Muench. med. Wochenschr.*, Vol. 57, No. 47, Nov. 22d, 1910.)
5. Groedel: Recent Advances in the Roentgen Diagnosis of Diseases of the Stomach and Bowels. (*Archives of the Roentgen Ray*, Vol. XV., No. 2, July, 1910.)
6. Barclay: Gastric Radioscopy: An Explanation of Some of the Difficulties in Diagnosis. (*Archives of the Roentgen Ray*, Vol. XV., No. 5, October, 1910.)
7. Hertz: The Diagnosis of Hour-Glass Stomach with the X-Rays. (*Archives of the Roentgen Ray*, Vol. XV., No. 4, September, 1910.)
8. Kæstle, Rieder and Rosenthal: The Bioroentgenography of the Internal Organs. (*Archives of the Roentgen Ray*, Vol. XV., No. 1, June, 1910.)
9. Adler: Diagnosis of Ulcer of the Stomach and Duodenum by the Roentgen Ray. (*Jour. American Med. Assoc.*, Vol. LV., No. 20, Nov. 12th, 1910.)
10. Reiche: Zwei Diagnose des Ulcers ventriculi im Roentgenbild. (*Fortschr. a. d. Gebiete d. Roentgenstrahlen*, Vol. XIV., No. 3 1909.)

There is probably no field of *x*-ray effort in which the work of individuals stands out so prominently as in the use of the *x*-ray in the diagnosis of gastro-intestinal diseases. The names of Holzknecht, Rieder and Groedel (5) will stand out pre-eminently as pioneer fluoroscopists. While the work of these men is more exhaustive, we must not overlook the American pioneers, Williams (1) of Boston and Cannon (2) of Harvard Medical School. It was the experimental work, in which Cannon studied the motility of the gastro-intestinal tract in kittens, that paved the way for the satisfactory researches of Holzknecht and Jonas.

(3). The observations of the clinician, Williams, are also acknowledged to have been of great service to these latter Viennese roentgenologists.

Following close in the wake of these men we cannot pass such names as Gottwald Schwarz, Haudek, Jonas (all associates of Holzknecht), Faulhaber, Jolasse, Goldammer, Cohn-Berlin, Albers-Schönberg; Pfahler, Leonard, Hulst of America; Hertz, Jordan and Barclay of England.

The fluoroscopic x -ray has proved of conclusive value in showing the filling defects, abnormal peristalsis, position and motility of stomach carcinoma. It has remained for some recent work, outlined above, to place at least one form of gastric ulcer upon a demonstrable x -ray basis. This type is the deep, penetrating ulcer of the lesser curvature, whose base before penetration, becomes adherent to the left liver lobe anteriorly or the pancreas posteriorly. The demonstration of the superficial stomach ulcer by the x -ray still holds forth a great future in research effort. Some recent literature, which will be reviewed in a later paragraph, has indicated that there was a most plausible possibility to demonstrate the site of superficial gastric ulcer by the adherence of portions of bismuth salts to the crater of the ulcer. Unfortunately, these claims are based upon but a very few cases and of these only the smallest per cent. came to an operation or post-mortem. Again, Hemmeter's efforts do not carry conclusive evidence, in that his experiments upon animals have not been duplicated by others, and his clinical cases were not proven. Jolasse's cases were few, also. Haudek and Faulhaber (l. c.) attempted to study out carefully the same technique of Hemmeter and Jolasse and failed to reach the same conclusions. Now, with all due courtesy and esteem to the gastro-enterologists, Hemmeter and Jolasse, it must be conceded that if trained roentgenologists such as Haudek and Faulhaber have failed to corroborate their findings, we must pause to consider the recent claims of Adler and Asbury (l. c.). Haudek and Faulhaber (l. c.), independently but contemporaneously, have published some splendid articles upon the positive diagnosis of the deep callous and perforating gastric ulcer. They have given definite fluoroscopic signs by which the ulcer base may be determined to be adherent to the pancreas or liver.

The technique of various observations reviewed in this essay is based upon the original work of Rieder of Munich. It consists in the ingestion by the patient of a bismuth meal composed of about 300 to 400 gms. of wheat pudding in which is incorporated about 40-60 gms. of bismuth subcarbonate or carbonate. Originally Rieder used the subnitrate of bismuth but for this has been substituted the carbonate by most of the continental roentgenologists. The English and American x -ray operators are partial to the oxychloride, which was first recommended by Hertz (7).

Hertz studied the various bismuth salts, when it was found that several ill-effects, that had been attributed to methemoglobin in the blood and nitrate poisoning, were produced by the decomposition of the subnitrate of bismuth. He found also that the carbonate or subcarbonate (the same substance, U. S. Dispensatory, Vol. XVIII.) of bismuth neutralizes the free HCL in the stomach; hence the important influence of the free acid upon the control of the pylorus is lost and the rate of emptying becomes abnormal although the movements are not altered. The oxychloride is not changed in the least by the stomach or intestinal secretions, and therefore answers the purpose of an unchangeable radiographically opaque substance.

The bismuth pudding is then, after ingestion, observed in the stomach upon the fluoroscopic screen. These observations are conducted in an

absolutely dark room, with appropriate x-ray apparatus that will protect the patient and operator from any possible ill-effects. That this is being done without danger cannot be gainsaid, notwithstanding the woeful observations of many who have not studied out the basic principles of protected fluoroscopy.

It may be well at this point to comment upon the superiority of fluoroscopy over radiography in the study of the gastro-intestinal tract. The radiograph reveals only the one single short phase of the functioning stomach. To one who has studied the changes in the gastric outline during peristalsis, it is clear that the single picture is of no elemental value. Bioroentgenography (8), or the moving x-ray picture, while approximating the fluoroscopic values, is too expensive to be practical and the technique is exhausting and liable to extrinsic errors. The close attention to the detail of the fluoroscopic examination as described later, in paragraphs descriptive of Haudek's and Faulhaber's work, will indicate several advantages which necessarily can only be appreciated by fluoroscopy. One cannot base conclusions of diagnostic value upon the single, or even repeated, radiographs, until a more practical and less expensive method of bioroentgenography is invented. The dangers of fluoroscopy are sufficiently preventable to standardize this simple method of examination.

Hertz (7) in a discussion of hour-glass stomach radioscopy (synonymous with fluoroscopy) points out that occasionally the appearance of a slight degree of hour-glass contraction is observed in cases which at subsequent operation show little or no narrowing, but that an ulcer is present near the centre of a lesser curvature. He suggests that the ulcer leads to a spasm of the circular fibres, the resulting spasmodic stricture appears and disappears during the progress of the examination; or if the stomach is observed during the ingestion of the meal, one would see the portion of the stomach above the spasmodic stricture fill with the bismuth pudding, then suddenly the spasm gives way and the filling of the stomach appears quite normal. If the ulcer is adherent to the liver and is upon the lesser curvature, as usually happens, we may have a permanent hour-glass constriction due to cicatrization about the ulcer. When the patient stands erect, the stomach tends to a vertical position, the ulcer is fixed and the line of tension is produced diagonally across the stomach and holds up the greater curvature where the line of tension meets it. The part of the stomach above the line of tension tends to sag down. He reports two cases of extreme hour-glass stomach due to the described phenomenon.

Barclay (6) draws attention to the first essential of fluoroscopy, *i. e.*, a clear idea of the normal stomach and the physiological actions of the muscular walls, including the tonic action and peristalsis. The upright position is urged in examination, which yields infinitely more information. He aptly compares our textbook knowledge of the stomach positions to any attempt to describe an India rubber ball, irrespective of the forces to which it is subjected. The outlines may be far from our idea of the normal, and yet the stomach may functionate properly. Barclay adheres to the Rieder type of normal J-shaped stomach; the loss of tonic action materially alters the character of the fluoroscopic shadow of and the level to which the contents descend. Barclay's observations upon the tonicity and peristalsis of the stomach in different pathological states (both functional and organic), are worthy of note, but not pertinent to this essay. Barclay considers the stomach an extremely sensitive organ, in which spasmodic contractions enter into active lesions, especially does

gastric ulcer (he does not state the degree of pathological interest) cause spasmodic contractions. Sometimes this spasmodic contraction indicates the site of an ulcer if the clinical symptoms also point to this; otherwise such phenomena are beyond a provisional diagnosis of ulcer. He cites cases in which the bismuth pudding descends to this point of spasmodic contracture (usually at junction of middle and upper third) to form a cone-shaped shadow, then the spasm relaxes and the bismuth passes in a thick stream to the lower segment of the stomach. Massage of the abdomen may relax the spasm.

If the tone of the gastric musculature is good the resultant filling shadow will be of normal shape, with only an indication of the spasmodic area. If the tone is defective, the bismuth mixture drops to the lower pole. If traces of bismuth are left in the zone of the spasm after milk is drunk, and then the area massaged, it almost indicates ulceration with cicatrization giving rise to the spasm. These spasmodic conditions, whatever the cause, are found elsewhere in the stomach than in the middle portion. For instance, ulceration of the cardiac orifice will cause obstruction with dilatation of the esophagus. He cites one case where the esophagus was dilated and pouched, in which the post-mortem examination revealed an opening sufficient to admit two fingers, and a carcinoma only within an inch of the cardiac orifice. A second case showed a great dilatation of the esophagus but no obstruction, and a gastrostomy revealed an ulcer near the cardiac orifice. He also observes that ulceration of the pylorus likewise leads to the symptoms, fluoroscopic and otherwise, of pyloric obstruction. Barclay states conclusively that we have at our disposal, in an ordinary *x*-ray equipment, sufficient power for gastric diagnosis, if properly arranged. As in clinical methods the diagnosis must be arrived at by deduction; therefore, we must obtain all possible assistance from other sources. He considers that gastric ulcer may be diagnosed by reason of bismuth left in the ulcer or in the pockets of cicatrices, but that its site is more frequently indicated by the spasmodic contractions which play a part in all lesions of the stomach and complicate the diagnosis. The presence of pyloric obstruction and hour-glass stomach are comparatively easy to determine fluoroscopically, and the need of operative interference in carcinoma especially, is frequently likewise indicated before the clinical diagnosis can be arrived at.

While the foregoing reviews would indicate a most enthusiastic ability to render diagnostic assistance, we would courteously comment that there are not sufficient case reports attached to render the above assertions conclusive. The fluoroscopic symptoms described are didactically correct and are warranted upon physio-pathological grounds. It remains for their substantiation by operative or post-mortem proof. The statement that a medicinal course of treatment directed toward the probable clinical ulcer was productive of a recession of the described fluoroscopic phenomena is not entirely satisfactory, but is at least hopeful.

At this point we beg to submit a criticism of the recently reported work of Adler and Asbury (9). It is only because this published effort has received such wide circulation in America that we consider this honest but puerile attempt to increase diagnostic knowledge of gastric ulcer. In the first place, the work was entirely by radiographs, and in the second place, is based upon the futile ambition of Hemmeter to prove that bismuth will mass itself upon the crater of an ulcer. Haudek and Faulhaber, who may easily be rated as superior roentgenologists to the investigators under discussion, have not been able to verify such probabili-

ties. Adler reports the efforts of Matthes of Cologne (the reviewer having been unable to obtain the original communication of Matthes and Adler fails to state his bibliographical references), who gave bismuth by mouth for several days and after discontinuing for two days, radiographed the patient. Matthes' idea was that a firm crust of bismuth formed upon the ulcer, which would persist. He was, however, successful in only two cases out of many. Such observations should only serve to show the futility of similar efforts, but Adler pursued an almost identical technique in that he gave bismuth carbonate $1\frac{1}{2}$ drachms in half a glass of water and waited four to six hours to take the first negative of the stomach area. If there was a shadow upon the negative he believed this to be the residue deposited in the crater of the ulcer, the stomach having emptied itself. A second negative of the stomach, now filled with a bismuth emulsion or suspension, was then taken to verify the constancy of this bismuth fleck on the first negative within the area of the stomach. He reports 6 cases; clinical evidence of ulcer was definite in 3, presumptive in 2; the x -ray shadows proved to Adler the diagnosis of gastric ulcer. But in only one case was an operation performed and ulcer determined absolutely. The other cases were cured by ulcer treatment. Such is not conclusive evidence of the value of this method and Adler fortunately states that his report is only preliminary. It is unfortunate that a representative American journal should publish such a report, which was most cordially criticized at the recent American Roentgen Ray Society meeting in Detroit, and which does not bear witness to a thorough knowledge of previous efforts in similar lines.

Reiche (10) was one of the first to report a roentgenological diagnosis of a gastric ulcer with post-mortem verification. The patient, a man of forty-seven, gave typical symptoms of gastric ulcer. The fluoroscopic demonstration of the bismuth-filled stomach showed a finger-like projection upon the lesser curvature, which filling defect could not have been due to any gross change in the walls of the stomach. The relation of the peristalsis of the greater curvature, or any compensatory contractions simulating hour-glass stomach are not mentioned. The post-mortem examination revealed a penetrating ulcer into the pancreas. Reiche makes note of the fact that the examination of the stomach twenty-four hours after original fluoroscopic effort did not reveal any bismuth remaining at site of ulcer. This may have been due to the fact that the penetrating ulcer had a clear exit with no pocketing or puckering of the edges at the stomach wall, such as is noted in Haudek's and Faulhaber's cases.

This isolated report of Reiche has been followed by the report of many similar cases by Haudek (3-4) and Faulhaber (2), who independently but contemporaneously, studied out carefully upon a large number of cases, the roentgen diagnosis of penetrating and callous ulcers of the stomach. Inasmuch as these two investigators have reported almost identical findings, the article of Haudek (4) will be reviewed at length because of its convenient systematic form.

Haudek (4) states: 1. The supposition, that remnants of bismuth attach themselves to flat superficial ulcers and give x -ray shadows, is wrong. 2. Remaining particles of bismuth, after a bismuth meal, are due to the deposition of the bismuth in pathological niches produced by cicatrization about ulcers. 3. The penetrating ulcer presents a special form of the x -ray shadows, in which there appears to be a diverticulum, and above this shadow there will sometimes occur a gas bag of air similar to the *magenblase* of the stomach. The roentgen examination

of penetrating ulcer will show: 1. An isolated fleck or projection of bismuth near the normally filled stomach. 2. A gas bag may be demonstrated above this bismuth shadow. 3. The bismuth shadow persists in this location, and, 4, palpation fails to dislodge or disturb this bismuth shadow. Faulhaber observes that the palpating hand of the operator will be able to press the bismuth contents to the upper and lower poles of the stomach, but that the bismuth shadow still persists in the niche of the ulcer. 5. If the patient lies upon the right side, after the ingestion of the bismuth meal, the bismuth can reach the usual site of the ulcer upon the lesser curvature more readily. 6. By turning the patient, the penetrating ulcer upon the posterior stomach wall (and covered, therefore, in the anterior posterior inspection by the shadow of the bismuth-filled stomach) can be brought into view. The penetrating ulcer usually attaches itself either to the left lobe of the liver if on the anterior wall, and to the pancreas if upon the posterior wall. The liver-ulcer is therefore near the anterior abdominal wall, and the pancreas-ulcer is farther away; therefore, the pancreas-ulcer shadow is behind the turning axis of the erect body, and if (1) during fluoroscopic examination in the erect anterior posterior position the tube is displayed sideways, the abnormal shadow of a liver-ulcer will show hardly any change in position, but if it is a pancreas-ulcer there would be a considerable side movement or displacement of the shadow with similar technique. If the patient is turned and the tube remains stationary (2) the liver-ulcer shadow moves in the same direction as the patient, but the pancreas-ulcer shadow moves in an opposite direction. Again (3), the liver-ulcer shadow moves with respiration and the pancreas-ulcer shadow does not. Lastly (4), by pressure upon the abdominal area corresponding to the ulcer shadow, or if the patient draws in the abdomen, it is seen that not only the bismuth shadow but also the liver moves upward. Such a sign is not seen in pancreas-ulcer.

Haudek mentions that in stomach-liver ulcer one finds a resistance, mostly in the epigastrium to the left of the middle line, or one may find a hyperesthetic area upon the anterior abdominal wall corresponding to the projected shadow of the liver-ulcer. Contrarily, the penetrating pancreas-ulcer has few clinical symptoms, with the exception of pain in the small of the back, which radiates between the shoulder blades, and no muscular tenderness or hyperesthesia.

Haudek cites 25 cases which he was able to follow through carefully and study in their clinical, roentgen, operative or post-mortem and subsequent history phases. Haudek considers all the cases of Jolasse and Hemmeter, in which the roentgen diagnosis was considered to indicate flat ulcers, to have been penetrating ulcers. Proceeding further, Haudek lays down some differential points between the roentgen diagnosis of gastric ulcer and carcinoma, *i. e.*, carcinoma gives the appearance of a filling defect produced by a pathology that encroaches upon the lumen of the stomach; the edges of the bismuth shadow are irregular and the area of the filled portion of the stomach involved is lessened. Contrary-wise, the penetrating ulcer-shadow is like a diverticulum to the normally filled stomach, with no material lessening of the gastric lumen. Also, in the penetrating ulcer which has produced quite an area of necrosis in the adherent organ, one will notice a gas bag above the bismuth-shadow which is rarely encountered in carcinomatous cases. Haudek quotes German surgeons (Kuettner and Payr) to state that from 26 to 43 per cent. of penetrating ulcers change to carcinoma. The diagnosis of a pen-

etrating ulcer, therefore, is a step toward the early attack upon an eventual carcinoma. While Haudek does not make special mention of the picture of an hour-glass stomach in his report, the various illustrations would indicate its presence frequently.

Faulhaber places eminent value upon the observation of an hour-glass indentation of the stomach in the region of the ulcer and the possibility of the recognition of a stomach-ulcer perforation into another organ, according to the technique described by Haudek. While the hour-glass constriction is almost always present where there is much cicatrization about an ulcer, it may also be present in the flat, florid type of ulcer. Out of 15 cases of hour-glass stomach examined, Faulhaber diagnosed 10 as due to a fluorescent ulcer. Four of these were operated upon and the diagnosis established as correct.

Faulhaber concludes that (a) with positive clinical symptoms and the fluoroscope showing a bismuth fleck or projection upon the lesser curvature, with a coincident and neighboring hour-glass contraction, the diagnosis of a deep adherent ulcer, eventually perforating, may be made with certainty and the case belongs to the surgeon; (b) with clinical conclusions of gastric ulcer, the presence of an hour-glass contraction alone cannot but place the diagnosis of gastric ulcer in the balance.

Rieder (1) likewise does not think that a fresh ulcer can be demonstrated, but if the ulcer is of the deep, penetrating or callous type, the diagnosis is possible indirectly by the pathological processes demonstrable. The fluoroscopic demonstration of secondary changes in form and size of the body and openings of the stomach caused by processes of contraction and perigastritis, permits conclusions to be drawn regarding past and existing ulcers and indicates the mode of treatment. Much of Rieder's article deals with the etiology of gastric ulcer. He recites similar roentgen findings to Haudek and Faulhaber. In addition, he mentions the possibility of a subphrenic (false) pneumothorax *i. e.*, a gas-containing abscess in and above the liver resulting from a perforating ulcer. The fluoroscope here shows the diaphragm pushed upward by the gas, while the underlying collection of pus will show a sharp line at its surface and the succussion wave may be shown by shaking the patient. Perigastric adhesions of the stomach wall to the abdominal wall prevent the excursion of the stomach with respiration and palpation. Adhesions of the stomach and colon prevent the separation of their bismuth shadows by palpation. Perforations into the small or large bowel will permit the observation of the passage of bismuth pudding from the stomach, as in a gastro-enterostomy. After considerable discussion of the different forms of hour-glass contractions, indentations, and the alterations in the filling of the stomach by such phenomena. Rieder devotes some space to the consideration of the intermittent or pseudo-hour-glass stomach which may be dependent upon an ulcer, erosion or other local irritation. Such spastic or tetanic contractions of the stomach muscles may persist for some time and must not be confused with an organic constricture.

The foregoing review brings us, therefore, to the conclusion that at the present time the fluoroscopic *x*-ray offers us advantages in the diagnosis of deep penetrating and cicatrized ulcers, while the fresh, florid ulcer cannot as yet offer conclusive *x*-ray evidence. There is no doubt but that the future will reveal much that is based upon the studied efforts of the men whose articles are here reviewed.

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RECENTLY PROPOSED REACTIONS FOR THE DIAGNOSIS
OF CARCINOMA OF THE STOMACH.

A REVIEW OF RECENT LITERATURE.

By JESSE S. MYER, M. D., of the Editorial Staff.

1. Lyle and Kober: The Glycyltryptophan Test for Carcinoma of the Stomach. (*New York Med. Jour.*, June 4th, 1910.)
2. Weinstein: The New Test for Cancer of the Stomach with Suggested Improvements. (*Jour. of the American Med. Assoc.*, Sept. 24th, 1910.)
3. Kuttner and Pulvermacher: The Presence and Diagnostic Significance of a Peptid Splitting Enzyme in the Stomach Contents. (*Berl. klin. Wochenschr.*, Nov. 7th, 1910.)
4. Livierato: Hemolytic Substances in the Stomach and their Supposed Specific Significance for Carcinoma. (*Berl. klin. Wochenschr.*, Aug., 1st, 1910.)
5. Grafe: Significance of Oleic Acid in the Diagnosis of Carcinoma of the Stomach. (*Muench. med. Wochenschr.*, Sept. 20th, 1910.)
6. Ascoli: The Specific Meiostagmin Reaction. (*Muench. med. Wochenschr.*, Jan. 11th, 1910.)
7. Ascoli and Izar: Meiostagmin Reaction with Malignant Tumors. (*Muench. med. Wochenschr.*, Feb. 22d, 1910.)
8. Meiostagmin Reaction. (Editorial, *Jour. of the American Med. Assoc.*, May 28th, 1910.)
9. S. d'Este: The Meiostagmin Reaction in Surgery. (*Berl. klin. Wochenschr.*, May 9th, 1910.)
10. Stabilini: The Meiostagmin Reaction and Malignant Tumors. (*Berl. klin. Wochenschr.*, Aug. 8th, 1910.)

There have been proposed within the last twelve months, several diagnostic tests for carcinoma of the stomach, which, if the results recorded in the first publications on the subjects are borne out by further experience, will play a valuable part in the diagnosis of this condition. One of these, the tryptophan reaction, rests upon the fact that the pepsin of the normal stomach does not hydrolize proteids completely, that is to say, no amino-acids are formed in the normal stomach. Cancerous tumors, however, elaborate an enzyme, which exhibits strong proteolytic powers and is capable of splitting proteins, as well as simple peptids into amino-acids. In testing for the presence of this enzyme in the stomach-contents, Neubauer and Fisher have made use of a simple synthetic peptid glycyltryptophan which when treated with a suitable proteolytic ferment is split into its component amino-acids, glycin and tryptophan, the latter being easily detected by simple chemical tests. An Ewald test-breakfast is extracted after thirty to forty-five minutes and filtered. Glycyltryptophan is treated with a portion of the filtrate and the mixture

placed in an incubator for twenty-four hours, and then tested for tryptophan as follows: About 3 or 4 c.c of the mixture are placed in a test-tube and a few drops of 3 per cent. acetic acid added. A saturated aqueous solution of bromine is then added drop by drop, until a reddish-violet to a rose-red color appears, which shows the presence of tryptophan. An excess of bromine must be avoided. Weinstein has found that the reaction may be obtained without glycytryptophan, for the reason that the enzyme secreted by the cancer is powerful enough completely to hydrolyze the protein of the food as well as the glycytryptophan. There are other reasons, among which are cost and possible instability of the product for dispensing with the glycytryptophan. Nor does Weinstein find that the Ewald test-breakfast is advisable. His directions are as follows: Four or five hours after a regular dinner some stomach-contents are procured, filtered and tested with bromine water for tryptophan. If present, the reaction is positive, if absent, some of the filtrate transferred to a stoppered bottle is put into the thermostat and tested again for tryptophan, after twenty-four or forty-eight hours. The most serious defect of the test is its inconsistency. The reaction may be present in one specimen and absent from another in the same patient. Therefore, tests of specimens obtained at three or four different times should be made. The stomach contents must never be blood-colored, nor stained with colored food-stuffs. Free hydrochloric acid may interfere with the test. Weinstein believes that the tryptophan test is a valuable sign in the diagnosis of gastric cancer, but is unable to say whether or not it is present early. There seems to be considerable danger that trypsin regurgitating through the pylorus may completely hydrolyze the proteins and give rise to the reaction. Nor is the test for bile sufficiently delicate to exclude the presence of trypsin. Lyle and Kober advocate waiting from twenty to twenty-four hours after the last meal before giving the test-meal, so that the intestines will be empty and regurgitation improbable. Still their experience with 10 cases in which they got a negative reaction, and in which there was no free hydrochloric acid, shows that regurgitation is at least not constant.

Kuttner and Pulvermacher on account of the cost of glycytryptophan have used a preparation of Hoffman, La Roche & Co., "Seidenpeptone," and find the results correspond throughout. They find the reaction valuable, but by no means specific. On the one hand, certain cases of undoubted carcinoma gave repeatedly negative results; on the other, normal stomachs and those with various benign conditions frequently showed positive reactions. This is in all probability, they say, due to the presence of pancreatic juice in the stomach, but they have not found tests for the presence of bile a sufficient control for the presence or absence of trypsin.

Grafe and Rohmer have found a hemolytic substance in the stomach of carcinomatous patients. This action they now believe is due to oleic acid which is powerfully hemolytic; 0.0003 grm. sufficing to hemolyze 1 c.c of a 5 per cent. emulsion of human corpuscles in two hours. The oleic acid comes probably from the degenerative changes in the tumor itself. The amount of oleic acid can be determined by the iodine titration method (Hubl). Not all stomach contents can be used for the determination. In cases of retention the stomach must be washed clean before the Ewald test-breakfast is given. If this is impossible the test is useless. There must be no duodenal contents present as indicated by the presence of bile-pigment. With this method Grafe, in 77 non-cancerous patients, found two positive reactions, and in 22 cases of carcinoma and 2 cases of ulcer the reaction was negative.

Livierato using a somewhat different technique was unable to find any specific hemolytic reaction whatever, the hemolysis occurring in about 50 per cent. of the cases tested irrespective of disease or health.

A test recently advanced by Ascoli depends upon a physio-chemical method, and aims at determining the presence of immune bodies in sera. (This test is applicable not only in suspected gastric carcinoma, but in carcinomata in general; hence it is only superficially touched on here. An exhaustive review of the literature bearing upon the Meistagmin reaction will be found elsewhere in this issue.) The term *meistagmia* (meaning small drop), has been coined by Ascoli, the appropriateness of the term lying in the fact that the surface tension of a given fluid may be measured by the size of the drop the fluid forms when flowing from a small pipette. Investigation was carried on to determine what changes, if any, occurred in the surface tension as the result of the reaction between the immune sera and their respective antigens. The measurements were made by means of Traube's stalagmometer. To a definite amount of serum from a typhoid patient (diluted with sodium chloride solution) was added a certain amount of antigen (extract of typhoid bacilli), and the drops immediately counted. The mixture was then placed into an incubator for two hours, allowed to cool, and then the drops were counted again. A diminution of the surface tension was found to occur under these circumstances, that is to say, the number of drops formed in a given time was increased. The differences are not great, 1 to 3 drops, but are definite and constant, and the technique according to Ascoli is not difficult nor subject to much error. The reaction takes place even in high dilutions of the antigen. Izar and Ascoli then applied the reaction to carcinoma, at first experiencing some difficulty in obtaining suitable antigen which was finally derived from the transplanted sarcomata of rats. It is noteworthy that this antigen from an *animal sarcoma* reacts with the *human* sera of individuals with *carcinoma*. The reaction, tested by practically the same technique as described above for typhoid, resulted positively in 58 of 62 cases of various malignant tumors, mostly carcinoma, and failed to give a positive reaction in 48 various diseases including two cases of leukemia.

S. d'Este has used the reaction before operating on tuberculosis and carcinomatous cases. In 10 cases of carcinoma and 2 cases of sarcoma, the reaction was always positive. In 10 benign tumors the reaction was negative.

Stabilini continuing the work of d'Este has found in 32 malignant tumors 32 positive reactions, and in non-malignant cases the reactions are uniformly negative. There is often considerable difficulty in preparing the carcinoma antigen and much care and patience must be exercised.

DIAGNOSTIC AND THERAPEUTIC NOTES.

THE USE OF THE CYSTOSCOPE IN THE EXAMINATION OF SEROUS CAVITIES.—Jacobaeus (*Muench. med. Wochenschr.*, 1910, No. 40). By means of a trochar, Jacobaeus punctures the pleural or peritoneal cavity, inserts a very small cystoscope through the opening and examines the serous lining. If an ascites or a pleuritic effusion is present, the procedure is evidently without danger. In the absence of fluid, injury to the lung or the intestines can be avoided by injecting a little air through the trocar, though Jacobaeus has found that with sufficient care this precautionary measure is unnecessary. In a number of cases he has found this method of considerable diagnostic value. Thus he was able to make out changes in the peritoneum suggestive of chronic peritonitis, could see distinctly cancerous nodules on the liver, perihepatitis and, in a clinically doubtful case, could make out a gastric cancer. In the pleural cavity, his observations have thus far not led to definite diagnostic conclusions.

CARBOHYDRATES AND THYROID EXTRACT.—Mayerle (*Zeitschr. f. klin. Med.*, Vol. 71, Nos. 1, 2). In the administration of thyroid extract, symptoms of intoxication may arise rather suddenly, especially when the dosage is increased. These toxic manifestations are due to a greatly increased proteid metabolism and fat combustion. Mayerle has found that the administration of large quantities of carbohydrates, in conditions of artificial hyperthyroidism, results in a diminished proteid destruction without interfering perceptibly with the increased fat combustion. As this is exactly the state of things ordinarily desired when thyroid extract is administered, he concludes that the diet of such patients should contain not only sufficient proteid, but also as large an amount of carbohydrate as possible.

THE EXAMINATION OF THE STOMACH BY MEANS OF BISMUTH CAPSULES.—Cohn (*Berl. klin. Wochenschr.*, 1910, No. 39). Gelodurat capsules are gelatin capsules treated by means of formaldehyde and are entirely insoluble in the gastric contents. Cohn has the patient swallow two such capsules, one filled with one gram of bismuth, the other partly filled with half the amount. The former promptly sinks to the bottom of the stomach contents, while the latter, being lighter, floats on top. When such a patient is examined radioscopically, the two capsules can be distinctly made out. Their position and their subsequent behavior give information as to the position of the lowest point of the stomach, the height of the gastric content at various stages of digestion and the general motility of the stomach.

SUBCUTANEOUS AND INTRAVENOUS ADMINISTRATION OF GRAPE SUGAR.—Berendes (*Zentralbl. f. Chir.*, 1910, No. 37). In cases where gastric alimentation is contraindicated, it is still customary to take refuge in nutritive enemata although it has been repeatedly shown that they are entirely ineffectual. Berendes recommends Kausch's method in such cases. This consists in the subcutaneous or intravenous injection of 5 to 7.5 per cent. solutions of grape sugar. These cause no more discomfort than similar injections of physiological salt solutions and are entirely harmless. If one liter is injected in the twenty-four hours, this represents the administration of 200 to 300 calories daily, an amount which may well suffice to tide the patient over his period of semi-starvation. After several days of this treatment, a slight glycosuria may set in, but this involves the loss of only 5 per cent. of the sugar administered.

DANGERS OF TUBERCULIN THERAPY.—Wolfsohn (*Mediz. Klinik*, 1910, No. 37). Wolfsohn reports a case, illustrating the fact that the tuberculin therapy may produce unfortunate results even in minimum dosage. The patient, a woman 34 years old, had 22 years before passed through an attack of coxitis, which had healed with considerable impairment of function. Recently, tuberculous abscesses of the right breast had made their appearance. In addition to surgical measures, a course of injections of new tuberculin was inaugurated, beginning with 1/10,000 mg. The breast infection healed rapidly and smoothly, but after the seventh injection the old coxitis scars reopened and resulted in obstinate sinuses with caseous suppuration. While such an unfortunate result need not lead to the abandonment of tuberculin therapy, it warns us to be extremely cautious in its use.

ABORTIVE TREATMENT OF GASTRIC CRISES IN TABES BY MEANS OF SPINAL ANESTHESIA.—Sapatsch-Sapotschinski (*Russk. Wratsch.*, 1910, No. 34; abstr. in *Deutsch. med. Wochenschr.*, No. 38). The pain of gastric crises is often so intense, that non-toxic doses of morphine are of no avail, and we feel obliged to have recourse to long continued ether or chloroform narcosis. In several such cases, the writer has been able to suppress or greatly diminish the pain by means of lumbar spinal anesthesia. The procedure seems logical and comparatively safe and deserves a trial in this desperate predicament.

SEVERE CHRONIC COLON SPASM.—Schuetz (*Berl. klin. Wochenschr.*, 1910, No. 37). Chronic, primary colon spasm is a rather rare disease, but one with a definite symptomatology. It probably always arises on a nervous or psychic basis. In Schuetz's cases, the diagnosis was apparently not difficult. The entire ascending colon, descending colon and sigmoid flexure could be palpated as strongly contracted and very tender cord and the skiagram clearly showed the entire large intestine to be participating in the spasm. The treatment is that of any other neurosis. As regards diagnosis, however, we are not justified in diagnosing primary (*i. e.* neu-

rotic) colon spasm, unless every local source of irritation can be excluded. We have observed two cases of what were apparently typical neurotic colon spasms. One turned out to be a chronic appendicitis, the other a carcinoma of the hepatic flexure.

ATROPIN IN GASTRIC ULCER.—Schick (*Wien. klin. Wochenschr.*, 1910, No. 34). In gastric ulcer, the resultant pylorospasm and hypersecretion are due to vagus irritation. The latter can be eliminated by means of the systematic administration of atropine and this explains the favorable results obtained by the use of this drug in such cases. Schick advises the daily hypodermic injection of one milligram of atropine for two weeks. The subjective symptoms, especially the pain, disappear promptly. The hyperacidity and the hypersecretion are more obstinate but with persistence in the treatment may also be made to vanish. He also obtained good results with this treatment in spastic constipation, lead colic, membranous enteritis and various forms of intestinal obstruction. He even finds this treatment worth a trial in gall-stone and renal colic.

Our own experience with atropin in gastric ulcer is not so favorable. The symptoms can unquestionably be relieved thereby, but the ulcer seems to persist since the production of occult blood persists and relapses are the rule. Two courses alone promise permanent results: prolonged rest in bed with bland diet or surgical interference.

ANESTHESIA OF THE EYEBALL IN NERVOUS DISORDERS.—Vidosi and Gatti (*Riform. med.*, 1910, No. 32). A number of diseases of the nervous system are characterized by a diminished sensitiveness to pressure on the part of the eye-ball. This phenomena is probably due to involvement of the sympathetic system and is especially valuable for the diagnosis of tabes dorsalis, in which it is sometimes an early symptom.

A VARIATION OF THE CUTANEOUS TUBERCULIN TEST.—Barabaschi (*Gaz. d. osped.*, 1910, No. 34). A small area of skin is energetically rubbed with a bit of cotton or gauze, wet with absolute alcohol, until the skin appears reddened. A little pure tuberculin is then spread over this area and allowed to dry on. This requires only a few minutes. The reaction sets in, in 24 to 72 hours, with the formation of small reddish papules that are often crowned with tiny vesicles. The eruption heals rapidly and never causes any inconvenience. The writer reports a large number of such tests made in the hospitals of Turin and Cremona. The method seems not inferior to that of von Pirquet and to possess a certain advantage in the avoidance of the scarification.

OBITER DICTA FROM FOREIGN JOURNALS.

ULTRAMICROSCOPY.

The interest in ultramicroscopy is undoubtedly on the increase if we are to judge so from the recent publication of N. Gaidukov's "Dunkelfeldbeleuchtung und Ultramicroscopie in der Biologie und in der Medizin," Levaditi's cinematograph films exhibited at St. Thomas's Hospital, London, on November 9th, 1910, and L. Houllevigue's "L'Ultramicroscopie" in *La Revue de Paris* of October 15th. The subjoined translation of Houllevigue's essay, we take it, has so many salient points to hold the reader's interest that a perusal of it can only result in profit:—

There is as much infinity in a particle of dust as in the whole firmament. Just as the telescope reveals to us the world of stars, the microscope conveys to us from day to day more and more of the world of the infinitesimally small. We are almost at the point where molecules can be seen, and are almost able to unite them into a mass by the strength of our reasoning powers.

And since the kinetic theory of matter has become a physical certitude, thanks to the microscope, it cannot be without interest to learn how, in the course of centuries, this instrument arrived at its present degree of perfection; in fact, ever since Zaccharias Janssen, a spectacle-maker of Middleburg, Holland, made the first one in 1590 by attaching two magnifying glasses to the extremities of a copper tube. The first microscope with which the Dutch naturalists of the seventeenth century made their interesting discoveries magnified from twenty to fifty times in diameter. The object pictures which resulted were not clearly outlined but were iridescent. Some years later Art and Science became closely associated and the spectacle-makers were succeeded by the opticians, who made considerable progress on account of their knowledge of theoretic optics. Thus in England, during the eighteenth and up to the beginning of the nineteenth centuries, the Dollonds perfected optical instruments, and among these the microscope. The ancestor of this famous line of opticians, John Dollond, showed how the object pictures could be improved by substituting for each of Janssen's simple glasses an assemblage of many lenses. This is the principle on which the eye pieces and objectives of the modern microscope are constructed.

But it is in Germany, at the present time, that we see the best example of the successful association of industrial technique and pure science. At Jena there are glass-works which are supported by the State and by subsidies from interested manufacturers, and in which technicians, who are at the same time savants, have developed a series of crown- and flint-glasses, by varying progressively the proportions of the divers constituents by substituting for lime various proportions of baryta and oxide of zinc, and introducing in the mass all those elements capable of being incorporated in a transparent glass: didymium, uranium, boron, manganese,

and arsenic. Finally, all the properties of the elements which were used were minutely studied. Synchronously the constructors perfected the cutting of glasses and the mechanical construction of the apparatus; while Abbé achieved, through incessant labor, the best method for manipulating the microscope.

One can form no idea of the above-mentioned difficulties, on the part of the technicians, in the face of the elementary theory of the microscope which had been firmly established for the use of students, and which can be defined as a method of approximation. In reality, the image of a luminous point is not a geometrical point, as this theory had it, but a complicated surface, which is called a caustic; and moreover each of the constituent colors of white light yields a different image. All these red, yellow, green, and blue images do not merge equally into each other and are not at the same point at the same time; hence, the image seen in the microscope was bordered with an iridescence.

It was necessary to correct all these defects; and before long an almost complete perfection was achieved by developing the principles of John Dollond and replacing the ocular and objective lenses of his microscope by lenses, the quality, curvatures and dimensions of which were carefully calculated. Finally, a step in advance was realized when homogeneous immersion was effected: the transparent specimen illuminated from below was covered with a cover-glass placed no farther than some 10 mm. from the anterior part of the objective, and in this narrow space a drop of transparent and decidedly refracting liquid—oil of cedar—was dropped. This proved advantageous, for it permitted the entrance into the microscope of a large number of luminous rays emanating from the object, which, without the oil, would have been reflected on the anterior lens of the objective; and further yielded images that were more clearly outlined, and were magnified to a greater degree.

But to achieve enlarged images was not the end of these German technicians; what they strove for was greater illumination. With a magnification of one thousand diameters, the image was one million times greater than the object, and, as a result, one million times less luminous; hence, it was found necessary to collect light from a stronger source and concentrate it on the point aimed at in studying the preparation. The microscopists of an earlier day achieved this by imitating the Italian bootmakers who use a bottle filled with water through which the rays are concentrated, so that a better illumination may be effected. But to-day we are in possession of better condensers: the concave mirror and the many convergent lenses. Nevertheless, the correct illumination should be less a matter of reunited light on the object, than the direction of the illuminating pencils of light with a convergence on one point. A negligence of this causes a phantasmagoria instead of a distinctly outlined picture. This is why the proper manipulation of the best modern microscope, with its strong magnifying glasses, requires considerable experience and technical knowledge.

Let us examine a microscope which in all its appointments represents the most modern type. It is supplied, as we all know, with two interchangeable objectives and eye-pieces, by which, without the preparation being touched, a magnification of fifty diameters up to from one to two thousand diameters can be achieved. With five hundred diameters we distinguish more of the details than with fifty; with one thousand more than with five hundred, but when we get beyond a magnification of from one thousand to two thousand diameters, although the image appears to us

to have a surface area four times larger, we cannot distinguish greater amount of details; that is to say, we have attained the limit of the separating power of the instrument. What takes place is analogous to what each of us has observed when attempting to enlarge a stereotype plate; a time comes when we gain nothing by increasing the dimensions of the picture. As regards the microscope, the separating power is determined by the smallest distance between two points which may be made out by the instrument. The unaided eye separates two points, the distance between which is not less than $1/20$ mm.; and this corresponds with the construction of the retina, which is a mosaic of rods and cones, of which each forms the contiguity of one of the juxtaposed filaments in the optic nerve. The eye distinguishes only the images formed on the non-contiguous elements of the retinal mosaic; therefore, when the eye is aided by a microscope which magnifies a thousand times, two points of an object are distinguished one thousand times nearer than could be done by the unaided eye; that is to say, the distance is one-twentieth of a micron. But this separating power is difficult to achieve, the best instruments attaining only three- or four-tenths of a micron; and this limit is realized only under the most favorable conditions; as for example when we examine the lines of a network traced on glass, the cilia of certain infusoria, or the striated carapace of some Diatomaceæ. Hence we are just as incapable of seeing molecules with the microscope, though the unaided eye can distinguish at a distance of 20 km. the movements of swarming bees.

It is to be hoped that this limitation which obtains to-day is only temporary, and that the microscopes of the future will correct the imperfections which we have pointed out, and attain a separating power ten or twenty times greater than at present. Unfortunately, according to our present knowledge, the limitation seems to be definite; for though it is an easy matter to increase the magnifying power of the eye-piece and the objectives, so that the images might theoretically be more exact, such are not the results according to experience. In fact, the theory of the microscope, similar to that of other optical instruments, has been established according to the methods of geometric optics, by conceiving that the luminous rays, which are reflected by mirrors and pass through lenses, follow the laws of reflection and refraction. Thus the problem of physics is closely associated with the problem of geometry. But this theory is pure fiction. In nature there is neither a luminous point nor a luminous ray, nor in geometry a point or a line; there are, however, luminous sources which are more or less extensive and waves which are propagated from these sources.

Assuming this point of view, which is the only one that is a truism in physics, the problem completely changes its nature. The solution of this problem has been given by Lord Rayleigh, the celebrated English physicist, somewhat in the following manner: "However perfect be the optic system when penetrated by light, each element of the luminous object gives forth as its image a small circle with "stumped" outlines, which is larger in case the illumination is red, smaller in a violet light, and very much contracted in an ultra-violet light." This theory illustrates the minimum diameter of the small dots which correspond to each radiating element from the object, but in no instance is it possible to abolish the distance between two points. These two points of an object appear separated only when the points are perfectly distinct; and since in increasing the magnification we enlarge at the same time the diameter of

the points of diffraction, we can easily understand that ere long we really gain nothing by increasing the magnification. In fact, this theory shows the limit of the separating power, which is the same as the limit which compasses the best microscopes to-day.

But Nature has thrust upon man an insurmountable barrier; hence, without changing in any respect our methods of observation we can help the results obtained from the microscope, by substituting the blue or violet rays for the white rays. In this way the circles of diffraction become slowly contracted and the details of the image are seen with greater exactitude. For a long time naturalists have recognized this artifice and have utilized it in the study of the minutest details in the structure of Diatomaceæ. The slight sensibility of the eye to blue or violet rays might at first make us think this progress illusory, but the facts show that by employing, as a source of illumination, ultra-violet radiations emanating from a strong spark between two threads of magnesium and cadmium, a decided advance is accomplished. By accepting this theory two difficulties become apparent: first, these radiations are invisible to the unaided eye; and, secondly, they are arrested by the glasses of the ordinary microscope. Koehler, however, triumphed over these difficulties in 1904 by constructing a microscope of which all the lenses are of quartz, the illuminating apparatus as well as the lenses upon which the preparation rests. In this way the eye is replaced as an instrument of observation by a photographic plate, upon which is designed a magnified image that can be observed at leisure, either by the unaided eye or by means of a magnifying glass.

One can easily understand the expenses, the painstaking researches, and the actual labor which all this involves. Here it would be well to mention that the ultra-violet rays have a physiological activity which rapidly causes the death of living elements submitted to their action. This constitutes a great inconvenience for physiological observations. Another defect, not less grave, is that the colorations, employed by the micrographists for differentiating the divers elements of their preparations, are not better seen when the ultra-violet rays are employed. Nevertheless, a great step in advance has been realized by this method, for the separating power has been almost doubled; in fact, two points between which the distance is only two-tenths of a micron can be differentiated. From the point of view of direct observation of molecular grouping which is accomplished by these latest improvements, we are justified in saying that the swarm of bees, which were mentioned before as having been seen distinctly at a distance of 20 km. can be seen just as distinctly at a distance of 10 km.

When this was accomplished we thought we had reached the ultimate step in advances as regards improvements in the modern microscope. But we were mistaken, for two German savants, Siedentopf and Zsigmondy, taught us a new lesson by means of ultramicroscopy. While we must admit that this science is still in its incipency, we are nevertheless in possession of a means of investigation, by which a more thorough study of microscopy can be effected than has been accomplished even by the most advanced methods, which brought to our knowledge the world of the infinitesimally small during the last few years.

To understand the subject of ultramicroscopy, it would be well to mention here some facts with which our daily observations have made us familiar. We distinguish perfectly the stars on the dark background of night, and though their distance from the earth is such that each appears to us extremely small—namely, a star of the fourth magnitude is

no larger in proportion than a molecule of albumin placed 15 cm. from the human eye—the telescope is so helpful an instrument that with it we are able to see those very small stars which bear the same relation to the larger stars that a molecule of mercury or of sulphur does to larger objects in our own field of vision. The rays which emanate from each star throw on the retina a small circle of diffraction with “stumped” borders, which appears to us much larger when the light received by the eye is more intense. And it is just for this reason that the stars of the first magnitude appear to us larger than the other stars, though their real dimensions are decidedly below what the eye could possibly perceive. Moreover, it is necessary to note that the stars become invisible in the daytime, because the light that they send to the retinal elements is not greater than the light which is diffused from the various points of the sky on the other parts of the retina. The result of these familiar observations is that even an extremely small body can be seen under the triple conditions of being luminous, of detaching itself from a dark background, and of being sufficiently far removed from other luminous points. As an illustration let us examine a beam of solar light, which penetrates into a dark room through an opening in the window-shutter. We will see thousands of particles of dust incessantly stirred by currents of air; many of these particles are extremely small, their diameter in some cases not surpassing some microns. If these particles were piled one on another on a table, and illuminated in the ordinary manner, we would not be able to see them with the naked eye, although they are visible in a ray of sunshine; for the reason that the waves of the solar light are broken against each particle, whence they diverge into diffracted waves which make the impression on the eye. The same effect follows when the atmosphere appears luminous to us, since each of its points diffuses, to a slight degree, the light received from the sun. A similar phenomenon is manifested when one pours into water certain essences which produce an opalescent cloudiness; the essence is divided into thousands of small drops of which each, diffusing the light which strikes it, acts as if it were a luminous point. These small drops are of variable dimensions, and these depend on the condition of the mixture. The diffused color varies in the same way. As a general thing, the smallest drops diffuse a blue radiation, while the particles which are larger emit by preference yellow or red radiations. Another theory advanced by Lord Rayleigh explains all these phenomena; it shows that the opaque particles diffract much more light than transparent particles of the same dimensions, and that the light, diffracted by elements of the same nature, varies as the square of their volume. For instance, if the diameter of a particle is reduced by one-half, the volume is eight times less and the diffracted light sixty-four times weaker.

Upon studying all these results we realize that when a small object is brilliantly illuminated, it behaves almost as if it were luminous itself; if it is isolated on a dark background, we can see it by means of the naked eye or the microscope, though we are not cognizant of its form on account of the image formed on the retina being always a small circle. But at least we know of its existence, and we can follow its movements. If there are many similar points in the field of vision, we can count them and, to a certain degree, appreciate their size, according to the quantity and the color of the diffracted light. The microscope has the advantage over the unaided eye in that the frontal lense of the objective takes the place of a pupil that is placed very near the object picture, and through

which more light enters than would into the human eye, were the eye necessarily a dozen centimetres from the same object. This simple calculation shows that the quantity of light utilized is about ten thousand times greater in the first case than in the second.

According to these principles, Siedentopf and Zsigmondy, of Germany, and later on, Cotton and Mouton, of France, not only conceived the idea of the ultramicroscope, but put it into practical use. Suffice it to say that the preparation, whether liquid or solid, is no longer intensely illuminated from below, as with the ordinary microscope, but laterally, so that no ray falling from a beam of light illuminates by entering into the microscope. A lateral beam, concentrated by the lenses and limited by the diaphragm, illuminates only a preparation of a thickness of two or three microns. This should be remembered if we wish to have the specimen seen by the microscope detach itself from a dark background. Without this occurring, the millions of separated particles of dust, microbes, debris of cells, which swarm in all preparations, will become the centres of diffraction and spread over the whole field of vision a diffused light analogous to what is seen in the Milky Way. These precautions taken, all that is necessary is to examine the thinnest part of the specimen by the intense illumination of a microscope which magnifies about five hundred times in diameter, to realize that on a dark background there are luminous points which are immobile, when the preparation is solid, or very animated in their movements, when the preparation is liquid or gas.

At once this question arises: What are the dimensions of the smallest particles which can be distinguished by the ultramicroscope? There are colored glasses which are made by incorporating in the vitreous mass traces of a salt of gold. This glass, when it is cooled rapidly, is perfectly colorless and transparent: the gold being perhaps in a dissolved state similar to sugar in water, or divided into such minute particles that they are invisible by all the known methods. On the contrary, if the glass is allowed to remain for a long time in a doughy state, the mass takes on a rose color which passes slowly into red, then into blue and brown; then the gold contained in the vitreous mass gathers in little particles visible under the microscope. From this it appears that a progressive concentration of the gold, which can be stopped at any point desired, takes place in a vitreous mass whilst rapidly cooling; the color of the glass depending on the condition of the particles of gold, which diffuse in an unequal manner different colors, according to their forms and dimensions. Contrariwise, if the colored glass is melted again the gold redissolves and the glass becomes colorless.

The explanation which we have just given was already proposed by Faraday in 1857, but it was regarded as purely hypothetical until Siedentopf and Zsigmondy devoted themselves to the study of this sort of glass for the ultramicroscope. In cutting the parallelipeds in the mass and submitting them to the lateral illumination which we have already described, they ascertained at first the presence of numerous brilliant points, which were more luminous but less numerous according to the time which had elapsed in the cooling of the glass. Therefore, the presence of particles of gold in colored glasses could no longer be doubted. But another step in advance was made by the possibility of estimating the dimensions of these particles. The analysis of glass yielding the quantity of gold contained in a certain volume, the investigators proceeded to count the visible particles in the ultramicroscopic field, the total volume of which was known; that is, the amount of gold. In this way the aver-

age amount of the particles of gold and their volume were measured. This method, applied to different types of colored glasses, showed that the smallest particles visible through the ultramicroscope had, when they were spherical, diameters between three and six millimicrons. No doubt, there are molecular agglomerations which are still smaller, and which will be visible to us only when our methods of observation are improved. Thus, certain specimens of red glass oppose an ultramicroscopic analysis because their coloration is due, beyond a doubt, to invisible particles of gold, or, as it is called "amicroscopy."

To illustrate the enormous progress which has been made, it would be well to give a list of the diameters of certain molecules:—

A molecule of helium.....	0.17 millimicrons
A molecule of mercury.....	0.28 millimicrons
A molecule of chlorine.....	0.4 millimicrons
A molecule of ether.....	0.6 millimicrons

It is necessary, when molecules are to be seen under the ultramicroscope, that they be increased ten times in diameter: that is to say, one thousand times in dimension; but the grains of gold, of which mention has already been made, should bear the relation of one thousand to ten thousand. Of course, it must be understood that these results have been realized only under the most favorable conditions, as the particles of gold are opaque, and have been immobilized by the glass; in fact, to succeed, the strongest source of light at our disposal should be utilized—namely, the solar light on a clear summer's day. What should encourage us in this work is the fact that at present the eye has a hundredfold capacity compared to what it had ten years ago.

The ultramicroscope, which is used only when we wish to see what is "beyond vision," has but few obstacles, for the molecules which we see by means of this instrument belong to a small domain that does not border on others which are as yet undiscovered countries. Hence, the inference must be that we are no longer blocked by an insurmountable barrier as was the case when further progress in microscopy was attempted. The area which has recently been opened up for us is free from obstacles: so much so, indeed, that it is highly probable that one of these days the limit attained by Siedentopf and Zsigmondy will be surpassed. To achieve what now seems impossible a greater concentration of light will not be necessary, but what will be imperative will be the substitution for the human eye of a sensitive plate which shall store up the effects of light during many hours.

BOOK REVIEWS.

DUODENAL ULCER. By B. G. A. Moynihan, M. S. (London), F. R. C. S., Senior Assistant Surgeon at Leeds General Infirmary, England. Octavo of 379 pages, illustrated. Philadelphia and London: W. B. Saunders Company. 1910. Cloth, \$4.00; half morocco, \$5.50.

Some years ago ulceration of the duodenum was looked upon as a rare disease; to-day, according to Moynihan, the disease is considered common, and diagnosis is made with a degree of accuracy not possible in many abdominal disorders. In the chapters amplifying the symptoms and diagnosis of chronic duodenal ulcer; he has in a characteristic way, with great clarity, developed his cases. Physical examination counts for little. The diagnosis is made by anamnesis. There is a periodicity in the recurrence of the symptoms with complete abeyance in the intervals. The attacks vary in length from two to three weeks up to several months, and come on after exposure or overwork. The pain comes on from two to six hours after eating, and is usually relieved by eating. In cases where there is acid dyspepsia it has been his experience to find duodenal ulceration, particularly in those cases where the acidity is of long standing, and the patient has occasional acid eructations. The pain is never as severe as gall-stone pains, and though it may be severe, it is tolerated. Food or an alkali has no influence in relieving pain in gall-stones, and the smallest quantity of nourishment is repugnant, while with duodenal ulcer food is craved, because of the relief.

The treatment is in all cases surgical, mainly because the disease is not recognized until there have been many attacks. The excision of the ulcer is advised in the few cases seen before the scar has started a stenosis. Posterior gastro-enterostomy, short-looped, has the greatest field of usefulness, but Finney's operation is at times indicated. This section of the book is dealt with in the detailed way that has made the author one of the greatest authorities on abdominal operations.

The section on pathology is full and complete. The illustrations from examples at operation and from pathological operations make the work complete.

MODERN SURGERY—GENERAL AND OPERATIVE. John Chalmers Da Costa, M. D. Professor of Surgery and Clinical Surgery in Jefferson Medical College. Philadelphia. Sixth Edition, Thoroughly Revised and Enlarged with 966 Illustrations, some of them in colors. Philadelphia and London: W. B. Saunders Company. 1910.

Textbooks on surgery follow each other fast, each with its own peculiar merits; some meeting the requirements of an increasing discrimination on the part of students and doctors, others falling far short. New books by new authors succeed according as their offerings fit into a real demand. Some find their work at once well received and appreciated, and in the later editions the merits are continued in the same degree which brought their earlier successes.

Da Costa some years ago started modestly but well, and met a demand which has brought forth many revisions, until now, as regards "modernity," it is perhaps the best textbook of modern scope that we can offer the student, or keep on hand as reference for the practising surgeon. Every field of work in surgery is clearly handled; the "last word" on any particular branch is given; and to help further study the proper bibliography is added. In this sixth edition particular mention has been made of arteriorrhaphy, direct transfusion, the use of aluminum bands in the treatment of aneurysms, the treatment of peritonitis, decompression for brain tumors, intravenous local anesthesia, treatment of infection by hyperemia, bacterial vaccines and many other distinctly "up to date" methods. Nevertheless, some statements will occasionally be noticed which have since been discredited, notably Rosenberger's method of finding tubercle bacilli in the blood. Again, we note an omission which would hardly have been made had the author waited a year and noted the tremendous popularity of the method practised in one of our St. Louis institutions, to wit: the method of Lane in treating recent fractures.

"SALVARSAN" OR "606" (Dioxy-Diamino-Arsenobenzol) ITS CHEMISTRY, PHARMACY AND THERAPEUTICS. By W. Harrison Martindale, Ph.D. Marburg, F. C. S., and W. Wynn Westcott, M. D. Lond., D. P. H., H. M.'s Coroner for North-east London. New York: Paul B. Hoeber. 1911. Price, \$1.50.

The busy practitioner who has read some of the literature on the Ehrlich-Hata discovery, but who is avid to learn more, will find in this excellent work an almost complete resumé of all the papers which have appeared up to date. The original articles having appeared in the German language, the handicap for the American physician, who could not read German, was a decided one; but this has now been removed, for here are selected with excellent judgment those salient portions of the many German articles, which are illuminating enough not only to instruct the interested physician, but to warn him against pitfalls. Moreover, the translation is well done and, in these days when garbled versions are tolerated only too often, this is in itself an outstanding quality. Of special interest is the description of the technique and, since this has been so variously discussed by those who are not well informed, a careful perusal cannot be without its reward.

THE TREATMENT OF SYPHILIS BY THE EHRLICH-HATA REMEDY (Dioxydiamido-Arsenobenzol). A Compilation of the Published Observations. By Dr. Johannes Bresler, Chief Physician to the Provincial Medical Establishment at Lueben, Silesia. Second Edition, Much Enlarged with the Portraits of Ehrlich and Schaudinn. Translated by Dr. M. D. Eder, with an Abstract of the Most Recent Papers. New York: Rebman Company. Price, \$1.00.

This translation of the second edition of Dr. Johannes Bresler's brochure, "Die Syphilisbehandlung mit dem Ehrlich-Hata'schen Mittel," is not without interest, since it is a careful reproduction in English of a work that was compiled by its author with all the thoroughness for which the Germans are noted. Compilations such as this have their value especially for the busy practitioner, who has neither the time nor inclination to wade through innumerable articles in a foreign language. If there is one criticism that can be passed on this book it is that since its appearance in English dress Dr. Bresler has published a third edition of his brochure with all the accumulative data up to date. But even so, there is sufficient material in this book to repay the reader for a careful perusal.

AERZTLICHE FORTBILDUNGSKURSE DER FREIEN ORGANISATION FÜR DIE MEDIZINISCHEN KURSE AN DER K.K. UNIVERSITÄT WIEN. (Postgraduate Medical Work Under the Patronage of the Free Organisation for Medical Courses at the i.r. University of Vienna). 2 Ausgabe. Berlin and Vienna: Urban & Schwarzenberg. (New York: Rebman Company.) 1911.

This excellent little book, descriptive of how to go about to get the right sort of postgraduate work in Vienna, should be read by all those physicians who contemplate a visit to this centre of European medical learning. On every page are printed instructions in English, French and German, and these are not of the perfunctory guide-book sort, but have evidently been arranged and edited with considerable judgment. Books of this sort are a decided asset to him who knows only of foreign medical schools through hearsay, for he can read here about the various courses at first hand, which is so much better than depending on the experiences of others. The Rebman Company has kindly consented to send this book, free of charge, to anyone making application.

DIE UEBERTREIBUNGEN DER ABSTINENZ. Eine Diätetische Studie fuer Mediziner und Nichtmediziner. Von Dr. Wilhelm Sternberg, Spezialarzt fuer Zucker- und Verdauungskranke in Berlin. 2 Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, 2.40 M.

This monograph of some 93 pages is a strenuous protest against total abstinence in general. The author points out, rightly enough, that the tendency in modern work in dietetics is to judge the various articles of diet solely in relation to their chemical and physical properties, without taking into consideration their flavor and general attractiveness. There can be no doubt that anything that makes a meal appetizing, renders it more useful as food,

especially in the sick-room. Hence the total exclusion of alcohol, spices and even tobacco from a patient's regimen may be a serious error. This plea for moderate use, instead of total abstinence, is overlaid with a vast amount of polemic which swells the bulk of the monograph without in the least adding to its value or interest to the reader.

DIE SYPHILISBEHANDLUNG MIT DEM EHRLICH-HATA'SCHEN MITTEL (Dioxydiamidoarsenobenzol). Zusammenstellung der bisherigen Erfahrungen. Von Dr. Johannes Bresler, Oberarzt an der Prov.-Heil-und Pflegeanstalt zu Lueben i. Schl. Zweite, bedeutend vermehrte Auflage. Mit den Bildnissen von Ehrlich und Schaudinn. Halle a. S.: Carl Marhold Verlagsbuchhandlung, 1910. Price, 1.80 M.

As a token of gratitude for an epoch-making discovery, Dr. Bresler has compiled this work which embraces all the facts made known to the profession up to the present time in regard to the new remedy for syphilis and all the experiences relating to its use. The first large edition was prepared in four weeks. The second edition is more than twice as extensive as the first, and is enriched with the portraits of Ehrlich and Schaudinn. This work will be welcomed by every physician who wishes to acquaint himself with this exhaustive treatise, as well as by all those individuals afflicted with the disease who entertain the hope of being cured through the medium of this therapeutic agent.

A HANDBOOK OF THE SURGERY OF CHILDREN. By E. Kirmission, Professor of the University of Paris, Surgeon to the Hospital for Sick Children, etc. Translated by J. Keogh Murphy, M. C. (Cantab.), F. R. C. S., Surgeon, Miller General Hospital for Southeast London, Senior Assistant-Surgeon Paddington Green Children's Hospital. New York: Oxford University Press. 1910. Price, \$7.00.

This is a complete treatise on the surgery of childhood and covers so great a territory that there is considerable loss of value in considering any particular topic. It seems unnecessary to translate a book of this nature from French into English; surely we have produced enough of them. The book, however, represents a certain French point of view which is valuable and the translation is well done. It covers the subject completely and includes many subjects, especially those where plastic surgery is done, which are not found in our English or American textbooks.

LA LUMIERE ASTRALE. Traité Synthétique d'Astrologie Judiciaire. Méthode facile pour l'érection du thème sans calculs ni tables des maisons. Jean Mavéric. Paris: H. Daragon. Price, 2 fr.

We have read Mavéric's booklet on astrology with interest and some amusement but, we confess, that the outcome was merely a state of mental confusion. The book is strictly up to date. Uranus and Neptune play their part in the control of human destinies, with platinum and radium as their metals. One is tempted to ask, why not the asteroids and the rare earths? But as the author points out, the spirit of merely scientific curiosity can never plumb these mysteries. They demand a devout and unquestioning receptiveness on the part of the neophyte.

NAHRUNGSMITTELTABELLE, zur Aufstellung und Berechnung von Diätverordnungen, fuer Krankenhaus und Praxis. Von Dr. Hermann Schall und Dr. August Heisler. Zweite, bedeutend vermehrte Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1910. Price, 2.50 M.

In tables, arranged so as to be readily accessible, this pamphlet contains an enormous amount of information. Nearly everything connected with the constitution, caloric value, physical properties and digestibility of all the usual articles of diet, together with a multitude of tables, useful in metabolic work, is here ready for instant reference. The book, from its nature, will appeal rather to the scientific clinician doing research work in metabolism than to the general practitioner.

PRECIS DE MICROBIOLOGIE CLINIQUE, par Fernand Besançon, Professeur agrégé à la Faculté de Médecine de Paris. Deuxième édition, entièrement refondue. 1 vol. in 8vo. avec 148 fig. dans le texte. Price, 9 fr.

Prof. Besançon's book is a very full compendium of clinical bacteriology. The clinician who is interested in this aspect of medicine will find in it all that he requires in the way of bacteriological diagnosis, with omission of everything that has only a purely scientific interest. The one fault of the book is that the author has concerned himself almost exclusively with the results of French research. German work is not often referred to, English and American work hardly at all. Nevertheless, work done elsewhere has usually been so thoroughly repeated in France, that it is surprising how little the book loses by these omissions.

BAKTERIOLOGISCH-CHEMISCHES PRAKTIKUM. DIE WICHTIGSTEN BAKTERIOLOGISCHEN, KLINISCH-CHEMISCHEN UND NAHRUNGSMITTEL-CHEMISCHEN UNTERSUCHUNGSMETHODEN. Von Dr. Johann Prescher und Victor Rabs. Zweite vollständig umgearbeitete Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1910. Price, 5.50 M.

An eminently practical book. In concise form it contains full directions for all laboratory examinations which the practical physician can have occasion to make. It contains all the newest refinements in laboratory diagnosis, in so far as they are sufficiently simple to be of use to the practitioner. For the more complex and subtle methods, the reader is referred to the more extensive textbooks.

TASCHENBUCH DER THERAPIE. Herausgegeben von Dr. M. T. Schnirer. Siebente vermehrte und verbesserte Auflage. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, Mk. 2.00.

The latest edition of this useful little volume contains some new features, such as a list of all the newer remedies, a directory of all the sanatoriums arranged according to the special purposes they serve, and finally brief descriptions of all the latest therapeutic suggestions with a bibliography to enable the reader to look up the original publications.

THE PRACTITIONER'S VISITING-LIST. 1911—THIRTY PATIENTS PER WEEK. Philadelphia and New York: Lea & Febiger. Price, \$1.25.

This pocket-sized book contains memoranda and data important for every physician, and ruled blanks for recording every detail of practice. The Weekly, Monthly and 30-Patient Perpetual contains 32 pages of data and 160 pages of classified blanks. The 60-Patient Perpetual consists of 256 pages of blanks alone. Each in one wallet-shaped book, bound in flexible leather, with flap and pocket, pencil with rubber, and calendar for two years. Thumb-letter index, 25 cents extra.

THE MEDICAL RECORD VISITING LIST OR PHYSICIAN'S DIARY FOR 1911. New Revised Edition. New York: William Wood & Company.

The visiting list is arranged in the customary way for the convenient registration of all work done by the physician. The list appears in two editions, adapted for either 30 or 60 patients per week. There are specially ruled pages for memoranda, obstetric engagements; for records of labors, vaccinations, deaths, addresses of nurses, and for cash accounts. The book is bound in flexible leather, with flap and pocket.

CONFIDENCES: TALKS WITH A YOUNG GIRL CONCERNING HERSELF. By Edith B. Lowry, M. D. Chicago: Forbes & Company. 1910. Price, 50 cents.

In this little volume the problem of propagation is rather clearly explained in language well adapted to the mind of a girl between ten and fourteen.

BOOKS RECEIVED.

- THE MEDICAL RECORD VISITING LIST OR PHYSICIAN'S DIARY FOR 1911. New, Revised Edition. New York: William Wood & Company.
- THE PRACTITIONER'S VISITING-LIST. 1911.—Thirty Patients per Week. Philadelphia and New York: Lea & Febiger.
- TRANSACTIONS OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION. For the Year 1910. Volume XXVI. Philadelphia: Printed for the Association. 1910.
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EDITORIAL.

THE "HIGHER CRITICISM" IN MEDICINE.

A critic of to-day, be his province art or literature or medicine, would think meanly of himself were the inspiration lacking him to interpret, with an unusual degree of originality, the subjects which his forebears treated in the most conventional manner. Originality such as this should not be discouraged, since it is only too apparent to all of us who have labored through the criticisms of a former day that their note was quite monotonous on account of an iteration that appeared to have no end. But when this is said the meed of praise that should be forthcoming, on behalf of what might be called the "higher criticism," has been meted out; and the accusation of a lack of appreciation cannot be advanced with any show of reason. Now, though our disapproval would be loud were a coldshouldering of the originality which informs this special criticism of the hour too evident, we must admit that when it runs riot a halt should be called, lest this admirable quality lose those graces which have hitherto placed it in the front rank of our most desirable mental assets. As regards this tendency to allow originality to go unbridled, a case in point, and one that is not without special appeal to all medical men, is the medico-literary criticism of the day, which is writ large in numbers of medical journals, and which is nothing else, in many instances, than the straining after effect of the medical mind in its desire to startle, with new and surprising judgments, the fixed and rather placid views that most readers have entertained in regard to certain men of genius and their works. That this is the order of the day cannot be denied by him who reads with intelligence; but even with the thought that the medical moderns should be respected on account of their innovating ideas, though

these be antagonistic to our preconceptions, may we ask in all humility why this "higher criticism" invariably plays around the sexual question?

The latest sinner in this respect is a writer in *The Hospital* (London) of February 11th, who in an article entitled "Genius and Decadence" sets forth his reasons for classing Walt Whitman among the homosexuals. Instead of fortifying his position by discussing, in the Freudian manner, Whitman's letters to Peter Doyle, the street-car conductor—letters which John Addington Symonds in "Walt Whitman—A Study" says "breathe a purity and simplicity of affection, a naïveté and reasonableness, which are very remarkable considering the unmistakable intensity of the emotion"—he reads between the lines of certain poems, to-wit: "What I Heard at the Close of Day," "A Glimpse," and others, those revelations of the poet's character which his mental attitude demanded upon opening "Leaves of Grass." Immanuel Kant, whose "Critique of Practical Reason" is rated by Otto Weininger as the greatest book ever written by man, says: "A belief, that is ordered, is a chimera," and nothing could be more illuminating as to the bias of the medical critic, when he brings his mental processes into play in connection with certain findings in an author's prose or poetry and then builds up a character, than his insistent application of this lamentably wrong tenet. If he were not scenting for this sort of deviation from the normal, we doubt very much whether he would be so successful in locating his quarry; but even in case the close study of certain lines is made by one who has no prejudices, and the resultant is an awakening to the fact that a feeling tinged with emotion existed between the author and a member of his own sex, ought he to embrace the conclusion at once that light has entered where darkness was before, and that there was all along abnormal sexuality which was but slightly hidden under the thin veneer of a subtle literary style?

What would not be the outcome were this false reasoning to continue, and what would not be the avalanche of "higher criticism" that would descend on our unprotected heads? How many days will elapse before some wight of the same order, with raucous voice learnt in the Freudian school of polemics, will elucidate for us the inner meaning of Elizabeth Barrett Browning's two sonnets, "George Sand: A Desire" and "George Sand: A Recognition"? Then there is that splendid passage in Macaulay's essay on Bacon—a passage that is rich in possibilities—and which runs thus: "He [Bacon] erected, at a cost of £10,000, a retreat to which he repaired when he wished to avoid all visitors and devote himself wholly to study. On such occasions a few young men of

distinguished talents were sometimes the companions of his retirement." And to cite another case could anything be more persuasive, more alluring for the modern analytical critic, who has won his spurs in medical "higher criticism," than the incident in Lord Byron's career when he forsook his sensual life among the Italians to join the military forces who were fighting for Greek independence? Can this act be construed otherwise than as a sordid chapter in a rake's life: a chapter which shows, in the most unmistakable fashion, that when sensuality and genius are combined, the former soon deteriorates into the abnormal. Hence, are we not justified in saying that the impelling force, in Byron's case, was not patriotism, but an irresistible desire to practise homosexuality with the Greek soldiery?

We, who wander along the beaten path with but small thought of the morrow, should not think too lightly of what the future has in store for us by reason of the precepts which will continue to flow from the ever-ready pens of our medico-literary critics. Although we smiled superciliously when Sigmund Freud declared in his work, "Drei Abhandlungen zur Sexualtheorie," that "sucklings who are given to sucking their fingers show evidences of an early sexual development which invariably results in hysterical disturbances during childhood"; although we scoffed at the idea when this same close observer advanced the startling theory that "a suckling was the agent of exciting his mother sexually by means of touching the nipples, and that a mother's love for her child was measured according to the excitation"; although we were superficial enough to laugh quite hilariously when Ernest Jones, a simon-pure Freudian, told us that Hamlet was sexually in love with his own mother, our merriment should not continue; for it is in the air that if we are not wary these stern students of our simplest and most innocent acts will ere long be at our heels to remind us of the abyss that is confronting us by being seen too often with members of our own sex.

But will they stop here and go no further? Will they be content only to warn? Or will they vitiate completely the literary, artistic, and musical phases of our lives by pointing out such pitfalls for our morals, as some of the poems which we have cherished or the music-dramas of Richard Wagner; for was not this composer a homosexualist, and how can one possibly be a "perfect Wagnerite" without being affected by a form of music that must be subversive of our normal sexual status?

THE PUZZLE OF VARIATION.

The abnormal are destined to receive more scientific study than formerly, now that so many investigators are working on the problems of eugenics. Some observers are quite positive that the production of better human types is beyond our powers, and that the best we can do is to learn how to prevent the birth of the worst. As this is preëminently a medical problem, it certainly behooves all physicians to keep in touch with current literature on the etiology of the defective constitutions which fill their case-books. We spend our lives patching up degenerates, and are thus in a position to find out what caused the defects. We may not discover anything of practical therapeutic use. Indeed, we know that effective treatment of this sort should begin with the grandparents. We must learn what happened to the grandparents to have such a profound toxic influence on their germ-cells, that the progeny were defective for three or four or more generations. This effect is so potent that it operates in spite of environment, good or bad.

Pearson's epoch-making work shows that we have vastly overestimated the effect of the environment, and yet we are paradoxically always harping on the proved fact that an adverse environment is the sole cause of departures from normality—bad habits, bad food, liquor and all the rest. The explanation is found in the potency of the effect of adversity—it acts for many generations in spite of efforts to restore the line to normal ruts. Children in the slums are not so greatly injured by the slums as we once thought, but they are biological "chips of the old block," which drifted to the slums because injured elsewhere.

The startling conclusion from all this new data, is that the causes of degeneracy are to be found in normal respectable families who live improperly. Their children are so injured that they cannot struggle for existence, and they drift into the only places where living expenses are within their reach. The new adversities do not cause much more damage but do not restore, and their children therefore resemble these abnormal parents and not the normal grandparents. In other words, the improper ways of living found in respectable families are more powerful in producing degeneracy than the conditions of the slums in increasing it.

The statistics of Elverton and Pearson, to which we have previously referred, show the mental and physical superiority of the children of drunkards. There is only one conclusion to draw from these remarkable investigations,—drunkenness as a rule must attack the higher types of a community rather than the mediocre or even the lower. The children inherit the superiority in spite of an alleged alcoholic poisoning of the

spermatozoid and ovule. The ovum, safely tucked away in the uterus, is able to develop in spite of considerable alcohol in the tissues of the mother, though as a matter of fact alcoholic tissue-changes are generally not very marked in the reproductive period, but show themselves afterwards even if the habit does arise early. We can well understand this process, but what is so puzzling is why alcoholic tastes should develop in superior persons so frequently. Every physician knows that the degraded sot is quite commonly of splendid stock, and that the children born to him before his decay may not inherit the taste at all, but show superior abilities, in spite of the bad environment later created by their drunken parents. The puzzle of the cause will no doubt be solved by physicians who are now making this a life-study in the new institutions for the incurable inebriates.

Luckily the trend is now in the right direction. Lombroso started us wrong with his theories which have been such failures because so little was then known of heredity and the causes of variation. In spite of their newness and baselessness, they were largely accepted and gave rise to a veritable flood of medical articles more or less absurd. Then everyone began to think for himself and there was a reaction during which but little was said. The pendulum is now swinging back and we notice an increasing number of articles bearing upon the causes. The school teachers are even taking it up because of the increasing number of exceptional children needing special training. All this is most wholesome, and in view of the enormous advances being made in the study of the causes of variation in the lower animals and plants, we may expect something of value soon. To this end we certainly think that the practising physician should make an effort to find out the causes of the weaknesses he finds in every patient, even if he must acquaint himself with the family history two or three generations back. We have referred to this several times, and repeat it now in order to direct attention to a critical study of the articles now appearing, which give the results of real investigations in lieu of the bizarre speculations of fifteen years ago.

We will learn in time how to prevent bad variations, but what is of infinitely more importance, we may learn the manner in which regeneration takes place. History is full of such incidences, and biology shows that lower organisms are almost invariably restored to the normal by a proper environment after modification by an improper one. Moreover, the ancestress of the great Edwards family of New England was a very abnormal woman whom our present-day enthusiasts would condemn to sterility.

OPINION AND CRITICISM.

MEDICAL TERMINOLOGY.

A subject which should be of perennial interest to all medical men who have passed through the stress of acquiring medical terms with some show of success, only to realize some months after that they must unlearn what had been got with such extraordinary labor, is the all-absorbing matter of a medical terminology that shall bring surcease of unnecessary upsets to the already sorely-tried medical mind. When the medical mind in its youthful estate—that is when it was still unconscious of the fact that its after-years would be devoted to the acquisition of the science of medicine—was ploughing wearily through the dense forests of Latin and Greek terminology, it unwittingly thought its tasks should be viewed with some degree of toleration, since they could not last for ever; but that the reckoning was done without foresight cannot be denied by anyone who has coped in vain with the unsystematic terminology peculiar to medical studies.

The human brain, be it engrossed in medical or lay matters, is capable of a certain amount of work: a platitude which has often been stated by physicians who have closely studied the phenomena of this very patient organ. But though this kindly consideration for the brain's capacity is not withheld from our various conversations, and though all around us there are undoubted signs that there are tendencies towards educational simplification, the science of medicine is completely divorced from the movement. Of course, we realize that this special science must, to be a living factor, take unto itself new branches oftener than perhaps any other science; but would all these recently added studies be the burden to the physician's mind that they are, if the nomenclature aimed at something better than words which fairly scream on account of the overcrowding of letters?

Dr. Félix Regnault, writing in *Le Progrès Médical* of February 11th, makes a number of pertinent remarks on this subject; and though he is in favor of using French words, instead of bastard Latinized or Grecized expressions, he is modest enough not to attempt a solution of the intricate problem. But despite his failure to land us on those shores of inviting verbal simplicity which would mean balm to our tortured brains, he advances enough thoughts to arrest us, even though it be only for a moment, in our wild dash after new additions to our already plethoric medical vocabulary. Why, asks this clever essayist, should we burden

our memory with proper names when we wish to designate a disease? Why call caries of the vertebræ of tuberculous origin Pott's disease, exophthalmic goitre Graves's or Basedow's disease, symmetrical gangrene of the extremities Raynaud's disease, locomotor ataxia Duchenne's disease, paralysis agitans Parkinson's disease? Would it not be more to the point, not to say more illuminating, to use terms that would convey some idea of the diseases themselves? Again, why, when our medical nomenclature is already overflowing with Latinisms that are understandable—our limited knowledge of Latin acquired in schools and colleges stands us, in this respect, in good stead—have a goodly number of words derived from the Greek been latterly introduced, when to most of us, even in our enthusiastic and omnivorous college days, this language was a bugbear that loomed ominously upon our horizons to sadden many days that otherwise would have been bearable? To cite only a few of these words, could anything be more forbidding, more repulsive to the ear attuned to euphony—and even the medical ear has some regard for this admirable quality—than trophoneurosis, rhizomelic spondylosis, acrodynia, acroparesthesia, and acromegaly?

We hold no brief for the English language as a medium for the correct expression in words of scientific thought; we know its deficiencies only too well; but remembering these deplorable lacunæ in an otherwise admirable language, we nevertheless feel that it is not so poverty-stricken that it could not yield a larger number of medical terms of purely English birth, if more pressure were put upon it. But the tendency in advanced medical circles is such to-day that it would be considered an unpardonable indignity to the science of medicine were it subjected to anything so commonplace as the designation of a disease in pure Anglo-Saxon. This is not the case in England, where even in medicine an English expression is often preferred to a bastard foreign one; but even there the invasion of the enemy is constant and uninterrupted. Nevertheless, enough British insularity obtains to place obstacles in the way of the intruder, and while the results are not encouraging they are not altogether discouraging. With us the conditions are different, what with our lack of insularity and the more or less Teutonization of medicine. But the wearied brain, that attempts to coin its lessons in our latest medical dictionaries, cares naught for these reasons, or if it gives them a thought, the balm which is extracted is a very poor soothing salve against an irritation which must arise from the vast medley of words which bear but a faint resemblance to a manner of speech that is a daily habit.

LITERARY NOTE.

Théodore de Cauzons, who is already known to a large circle of readers, not only in France but elsewhere, on account of his profound

studies in connection with the origin of sorcery, the hunting down and punishment of witchcraft, the arrest and conviction of the Knights Templars, and the trial which led up to the burning of Joan of Arc at the stake, describes in the third volume of his work, "*La Magie et la sorcellerie en France*" (Paris: Dorbon, 1911), the history of sorcery in the sixteenth, seventeenth and eighteenth centuries. It surely must appear paradoxical to all readers that these three consecutive centuries should be witness to the greatest development of sorcery: centuries which taken in order are red-lettered in history for the protest against papal Rome which eventuated in what is historically known as the Reformation, for the deprivation of the Mother Church's great influence in temporal matters, and for the substitution of Reason and Philosophy for religious dogmas that were against reform. The Middle Ages, strange to say, though their credulity was childish and life for the greater part was dedicated to the worship of the Almighty, the saints, and the devil, were quite free from the innumerable sorcerers, and magicians, who during the centuries which have been mentioned engaged the attention of ecclesiastical judges, parliaments and even kings. Justice ran riot to so great a degree that accusations were made on the slightest provocation and scenes were enacted at the various so-called trials that embodied everything that was grotesque and horrible. Thousands of human beings who had hallucinations were regarded as guilty of witchcraft and were imprisoned or burnt at the stake. M. de Cauzons describes in detail the strange occurrences which led to a belief in sorcery. In France, and especially in England and Germany, the onward march of this fiendish belief in the untoward workings of the supernatural proceeded without let or hindrance. The indictments against the Dominicans of Berne, the persecution of all sorcerers in Protestant countries, the prosecution of the Ursulines of Loudun, the burning of the unworthy but unfortunate Urbain Grandier, victim of Laubardemont, councilor of State and tool of Richelieu, who was also responsible for the deaths of Cinq-Mars and de Thou, are among the occurrences which darkened many pages of the history of this time. During the reign of Louis XIV. the Marquise de Brinvilliers exercised her unusual gifts as poisoner and was duly executed, La Voison, the pretender to prophetic knowledge was burnt, and the Black Masses were instituted: a period in French history when the inner life of the Court, and in fact of the whole city of Paris was thoroughly ventilated in the close quarters of the "*Chambre ardente*" and under the scrutiny of La Reynie, first lieutenant-general of police, and the gossipers of scandalous remarks anent the "Sun King" or his favorite of the moment, Mme. de Montespan, were speedily punished by their prompt removal to prisons or neatly executed, for were they not troublesome witnesses? But though quite innocent offenses were severely and even barbarously punished, the strong probability of the infernal machinations of the

demons invading the human frame was no longer a fixed belief, for already an awakening took place among the persecutors by which they realized that, by the extortion of money from unfortunates who were willing to pay heavy bribes, demonical obsessions could be exorcised. In the eighteenth century, it would be well to chronicle here, the presiding judges, in cases that were being tried for witchcraft, showed a greater degree of intelligence, for instead of consigning this class of criminals to indefinite stays in prison, or ordering them to be tortured on the rack or burnt alive, they displayed some show of humanitarianism in so far as it occurred to them that the insane asylum was the proper abode for the obsessed. The convulsionaries of Saint-Medard, for instance, when they indulged in their hysterical manifestations, under the thin guise of religion, around the tomb of the pious Jansenist, François de Pâris, in the eighteenth century, were treated quite humanely by the law when comparisons are made with what was the fate of the nuns of Port-Royal and the leading Jansenists during the stormy times of 1661. A royal edict closed the cemetery and only a small number of these misguided enthusiasts were sent to prison, where they were kept under surveillance until their restoration to sanity, or as happened only too often, their incarceration being prolonged, their already unbalanced minds broke down completely. It was at about this time that the belief in sorcery ceased altogether and the belief in magic arose, although rationalism was dominating European thought and the Encyclopedists were in full sway. With the arrival of the Viennese doctor, Friedrich Anton Mesmer, in Paris, with his theories about psychic and somatic phenomena as shown in magnetic and somnambulistic states, we recognize the beginnings of the neuropathy of to-day. Even the disinterested and those, whose investigating minds were, as one would suppose, above the fascinations of so flimsy a science as was mesmerism, were caught in its meshes, and the result was that men like Puységur and many others were so completely carried away by its teachings that they did not hesitate to say that at last all the problems of the universe would be solved, that all diseases would be cured, and that mind had so greatly triumphed over matter that at last there was no further need of the intervention of our special senses; otherwise mind-reading, reading with the eyes bandaged, levitation, etc., would not be possible. In the crowds which followed this charlatan were rogues and tricksters, but the one who was most seductive, who was *par excellence* the cheat of cheats, was surely the mountebank who hailed from Palermo, Joseph Balsamo, self-styled Cagliostro. In his youthful days when he was still Joseph Balsamo, he familiarized himself with the Hermetic art of the ancient sacred books of Egypt. The jumble of incongruous theosophical, alchemical and astrological ideas contained in the writings of Hermes Trismegistus appealed to him, for his acumen at once told him that this was exactly what he needed with which to astonish and bamboozle those—and their number was legion just as it is to-day!—

who are ever willing to be seduced by something that is both novel and incomprehensible. To the consummate art of the magnetizer, Cagliostro added ventriloquism, prestidigitation, and above all an unbounded audacity. Driven from pillar to post he nevertheless took a cheerful view of life, and his unquenchable jauntiness never forsook him, whether he took up his residence in Barcelona, Madrid, London, Paris, in Belgium or in Germany. Swindler, pander, and even murderer—the accusation had been brought against him of having murdered his master in the art of magic, Althotas—his purse never told the tale that fortune was against him. In England he joined a Masonic lodge. Immediately afterwards he started an Egyptian lodge. He saw at once how helpful this sort of membership would be to him in the matter of increasing his prestige, and as a means to an end; that is, he hoped with the secrets that he would acquire through his intimate association with other members to strengthen his powers of divination. He called himself the Great Copt, supreme chief of Coptic freemasonry, the repository of the ancient secrets of Egyptian lore revealed to him some three thousand years before, thus establishing, beyond the shadow of a doubt, his great age. He was about to create a supreme council of thirteen members, which would no doubt have been composed of dupes and cronies, when the affair of the diamond necklace was unearthed, and the imprudence of Marie Antoinette, the stupidity of Cardinal de Rohan, the knavery of La Motte and Madame de La Motte were made the subject of a great scandal. Cagliostro was banished, but though disgraced his departure was not unattended by scenes which must have been balm to his wounded feelings; for when he embarked for England at Boulogne, 5,000 people knelt before him and begged for his benediction! Regarded as a spy and secret agent he soon was compelled to leave his newly found asylum, whereupon he went to Rome where he was arrested and arraigned before the Holy Inquisition and condemned to imprisonment for life. The career of this arch-imposter, as well as the lives of others who were only suspects, teaches us a very good lesson—namely, that when such humane means of punishment exist as the Inquisition, the rack, and the stake, culpability is always severely chastised, and that it is quite unfortunate to be born some two hundred years too soon, for in our modern times a decided distinction would be made between those afflicted with hallucinations and those whose criminality merits the severity of the law.

ORIGINAL ARTICLES.

THE BEARING OF OLD AND NEW FACTS UPON OUR CONCEPTIONS OF CARDIO-VASCULAR DISEASE.*

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There are several reasons why I have chosen this subject: First, because it is one which is of vital interest to medical men. Cardio-vascular disease is not only a common condition among patients, but also the commonest malady to which medical men fall victims. Again, cardio-vascular diseases are being investigated to-day far better than ever before, and it behooves us to compare our old knowledge with the new facts. Lastly, cardio-vascular lesions result in conditions which govern the conduct not only of the physician and the surgeon, but the specialist who devotes his skill to such limited parts as the eye, the ear, and the nasopharynx.

Many of us, when students, have regarded the elementary or fundamental departments of medical science as stepping-stones which had to be passed over in order that the coveted ability to practise medicine might be obtained, but we look back to-day and wish that we had recognized that a full knowledge of these departments would be of infinite use in after-years. For example, how prone we have been for years to think of the heart as an organ, whose sole connection with the vessels was one of contiguity or continuity, and to ignore the fact that at a very early period in embryonal existence the heart is only a blood-vessel, and that its final structure is simply a special overgrowth of the muscular fibres which, on the one hand, form a heart and, on the other, a coat of the arteries. A recollection of this simple matter in embryology impresses the fact upon us that a host of causes which affect the vessels must affect the heart, not only indirectly but directly, and emphasizes the need of considering the whole circulatory apparatus as a unit, except in a few instances in which the high specialization of the heart-muscles renders it peculiarly susceptible to certain poisons or infections. Such a conception of the cardio-vascular apparatus gives us, both in acute and chronic disease,

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a much clearer view than the old one in which the heart received all our attention and the vessels were largely ignored. So, too, in physiology, how many of us in years past have failed to recognize the importance of subsidiary vasomotor centres, dilator and constrictor, in our studies of circulatory disorders, functional and organic; and in pathology and morbid anatomy, how prone we have been to consider the vessels in the celiac axis, the basilar or coronary systems, as normal because those of the forearm showed no sign of atheromatous change! To-day, we must recognize that disease affecting one part of the circulatory apparatus is likely to affect all of it, and yet, on the other hand, remember that marked lesions may develop in one part and leave other parts intact.

Even those, who in the past gave the vessels more attention than many of their colleagues, nevertheless placed the heart first and the vessels last in importance, but I feel now that the reverse should be our attitude and that careful study of the vessels will give us as much information as we may get by direct examination of the heart. How many cases of so-called cardiac disease depend in reality upon cardiac fatigue due to vascular disease? How many cases of supposed dyspepsia and of abdominal pain have their origin in disease of the abdominal vessels, and how many cerebral symptoms and renal symptoms rest upon a similar basis? My experience is that many cases have such an origin. To-day, we appreciate that the state of the vessels may completely control our diagnosis and treatment in acute illness. If, for example, a young man with bad vessels and an old man with good vessels are attacked by croupous pneumonia the prognosis is, other things being equal, bad in the young man and good in the old one. The presence of degenerated vessels makes us recognize that the pneumonia is in the nature of a terminal infection, a method designed by nature to remove one of the unfit, and from the immediate point of view indicates that his heart is probably also affected and in addition tired by its effort to pump blood through narrowed paths.

In this connection I wish to call attention to a method of diagnosis, prognosis and treatment, that has not received the attention it deserves.

In the *Therapeutic Gazette* for last June, I made a report as to the value of studying blood-pressure in pneumonia for the purpose of determining the state of the heart-muscle and the need for stimulation or cardiac support. G. A. Gibson, of Edinburgh, first called attention to the relationship of blood-pressure to heart-force in acute pneumonia in the *Edinburgh Medical Journal* for January, 1908, in the course of an article, entitled "Some Lessons from the Study of Arterial Pressure." This important observation of Gibson's is buried in a paragraph dealing with another matter, and this accounts in all probability for the fact that comparative little attention has been paid to it. To use Gibson's words, "a pressure appreciably below normal in pneumonia is invariably of evil omen, and any considerable fall bodes disaster. When the arterial pres-

sure, expressed in millimeters of mercury, does not fall below the pulse-rate expressed in beats per minute, the fact may be taken as an excellent augury; while the converse is equally true. From the work of the last few years in my own wards no fact is more certain than this." To this matter attention was called in a valuable article which was published in the *Edinburgh Medical Journal* for January, 1910, by G. A. Gordon. Gordon's results are entirely in accord with those of Gibson. In 15 cases of pneumonia, which he studied, there was not a fatal result when the blood-pressure, expressed in millimeters of mercury, was maintained above the pulse-rate per minute, and in only one case did it happen that recovery occurred after the blood-pressure was persistently below the pulse-rate. This patient got well by the immediate administration of strychnine, quinine, and strophanthus, which, to some extent, restored the normal ratio. Gordon adds: "It may be one's good fortune sometimes to save a case in which the blood-pressure is persistently below the pulse-rate, but these cases will be few."

During the past year I have had in my wards in the Jefferson Medical College Hospital a considerable number of cases of croupous pneumonia occurring in patients widely separated in years of age and in physical condition; widely separated also as to the size of the pulmonary lesions, as to the degree of toxemia, and as to the previous history and the state of such important organs as the heart and kidneys. The results which I have obtained fully corroborate the observations made by Gibson, and later by Gordon. In all cases in which the blood-pressure fell to the pulse-rate or below it, active stimulation was instituted. In those cases in which the blood-pressure bore a normal ratio to the pulse-rate, and the heart signs were satisfactory, no treatment by drugs was resorted to.

In the past we have been accustomed to control therapeutic measures by the study of the first sound of the heart, the pulmonary second sound, and the aortic sound; by the results obtained by palpation of the radials, by the degree of dyspnea and amount of cyanosis and venous turgescence. It is not necessary to state that these observations should be continued, for they are most important. But the point which I wish to emphasize is that by the use of the sphygmomanometer we can keep track of the patient from day to day, record his circulatory state, and when an intelligent trained nurse or resident physician is at hand, observations can be made so frequently, in the absence of the attending physician, that any tendency to circulatory failure can be discovered and equally promptly combated.

If the pressure remains approximately normal and the speed of the heart increases, this would seem to be indicative of disordered cardiac action caused by the direct effect of the disease upon that organ, and the heart should be treated as the chief factor of importance. But if, on the other hand, the pressure falls considerably and the pulse-rate rises simultaneously, then we have reason to believe that the vascular system is

in need of stimulation, since the heart is endeavoring to fill relaxed vessels by increased activity. This view is strengthened if, on auscultating the heart, we find its first sound fairly strong. Under these conditions vascular tone rather than cardiac tone is desired. If the sphygmomanometer shows the pulse to be slow and the pressure high, the nitrites are properly needed; but if, on the other hand, the pressure is low and the heart is beating rapidly in its endeavor to fill relaxed vessels, the nitrites are very deleterious, as by their use we greatly increase the very state which the tired heart is endeavoring to remedy by extra effort. Yet I venture to say that there is no more common error in therapeutics to-day than the use of the nitrites in circulatory failure of pneumonia. They ought never to be used if the pressure is below normal, but only if it is so high that we fear the heart will become exhausted in trying to drive the blood through the narrowed blood-paths. Even if the blood-pressure is above normal, this does not necessarily indicate the nitrites, because it is to be borne in mind that in the early stages of pneumonia a pressure above normal, if not excessive, may be a normal manifestation of the malady due to the stimulus of fever, and perhaps with the object of so increasing the rapidity of the circulation that phagocytosis and other protective processes may be aided. We are all so fearful of circulatory failure in this disease that the temptation is constantly to stimulate from the first, and to fail to recognize that many variations from the normal are the result of the adaptation of the body to the new conditions engendered by the disease. We must give nature, at least in the early stages, the credit of knowing what is the best thing to do to save the patient and give nature a chance. A ship which lies on an even keel in a driving gale is water-logged and lost. So in disease, many circulatory conditions may arise, which in a healthy man would be indicative of grave disorder, but in a man stricken by pneumonia may be natural. The man who "water-logs" his craft to keep her from going up and down in the storm courts disaster, yet how often do we, by the use of remedies, try to keep the patient on an even keel instead of allowing him to rise and fall with the waves of his storm. The study of the blood-pressure, or the vascular state, in pneumonia, gives us facts that enable us to avoid water-logging our craft, or over-drugging the patient; and it also tells us when the seas are running so high that the craft may be swamped, if we do not pour oil on the water and so enable the ship to ride out the storm. By this means we medicate only when necessary and we do not give medicines because the patient has pneumonia. I fail to see why a physician should order stimulants or sedatives for a case of pneumonia for the next twenty-four hours. What captain, whose ship was in a terrible storm, would write out orders for the next twenty-four hours and go below to sleep?

If at one time the pressure is high enough to cause the heart undue labor it may be reduced by one or more doses of one of the nitrites, and if the pressure falls it may be raised by one or more doses of a vascular

stimulant of which I believe belladonna and atropine to be of the best, not because it greatly stimulates the vasomotor centre, but because it equalizes the distribution of the blood. At one time atropine was thought to act as a universal vasoconstrictor, and the fact that the vessels of the skin were widely dilated by its use was ignored. The good that followed its use was supposed to be due to the rise of pressure it caused; but I question if this is entirely true, for a rise of pressure means more work for the heart. I think that the chief value of atropine in failing circulation is that it prevents bleeding into the great abdominal vessels, dilates those of the periphery, and so equalizes the circulation or restores circulatory equilibrium. Circulation alone, without balance or equilibrium, is never seen in health. Even the rigid pipes of this building, which heat it, would not functionate properly if the equilibrium of their circulation was so disturbed that in some the flow was so sluggish that no water was distributed to certain rooms. The restoration of circulatory equilibrium or normal distribution, is the explanation of the value of alcohol and the cold bath in enteric fever. Furthermore, the restoration of circulatory equilibrium not only permits proper oxygenation and nutrition, but it greatly decreases the work of the heart, which, if ischemia exists in one part and congestion in another, finds its peripheral resistance at such variance that it cannot act properly, vainly endeavoring to fill empty vessels at one point and to empty engorged ones elsewhere.

This brings me to another topic—namely, our attitude as to high pressure in those not acutely ill, and its state when such persons are stricken with an acute malady. An immense amount of statistical evidence establishes the belief that a systolic blood-pressure of about 140 is the normal for an adult male; and although this knowledge is of value it is nevertheless capable of leading us astray, if we get the impression that it is normal for *everyone* who has reached adult life. There are few functions of the body so readily varied by slight causes as the maintenance of blood-pressure. Those with experience know that in nervous persons the pressure may be elevated 10 to 20 mm. of Hg. by the knowledge that the pressure is being taken. A pressure taken in the consulting-room may be so different from the patient's ordinary pressure as to be useless as a gauge of his average circulatory state.

If he has any tendency to arterial spasm, and his heart is strong, the pressure may be very high, whereas if his heart is tired and weak the exertion of visiting the physician may cause an abnormally low pressure.

As I have repeatedly pointed out before, the development of spasm or fibroid changes in the vessel-walls, if the heart is capable of expending more power, results in a high blood-pressure which is essential to the life of the body. Inelastic vessels, more or less rigid, interfere with the passage of blood to such an extent that a higher pressure must be kept up to drive the blood through them. If we attempt to lower the abnormal norm that nature has established, to the theoretical norm we

produce a state in which the necessary distribution of blood is impossible. This represents a case in which an abnormal norm of 170 has been established and fever has raised the pressure to 190 or 200. The abnormally slow pulse of 60 and the character of the heart-sounds show that that organ is laboring. We should not try to bring the pressure down to the theoretical or statistical normal of 140 but to about 170, and thereby relieve the heart of the extra burden between 170 and 200. The pulse-rate is now dangerously fast; we must endeavor to raise the pressure to approximate the pressure which is actually normal for that man and slow the action of the heart.

Recently one of my assistants at the Jefferson Medical College Hospital, Dr. Lull, has been carrying out these studies in connection with anesthetics. In one case, with the onset of the operation, the pre-operative blood-pressure of about 200 fell in a few minutes some 60 points. Surely this was not an indication for the use of nitrites, although the almost routine, but erroneous, use of these drugs in circulatory failure would probably cause their administration by many otherwise well-trained men. Indeed, the excellent character of the heart-sounds, and the fact that the pulse-rate was not greatly raised, lead me to believe that the anesthetic may, by its sedative effect, have relaxed spasm of the vessels and relieved the heart of extra labor. Here is another illustration of the value of comparing blood-pressure and pulse-rate. If as pressure fell rapidly the pulse-rate greatly quickened, the increase speed would show that the heart was endeavoring by extra labor to maintain a higher and essential pressure. On the other hand, if as the pressure fell the pulse-rate quickened but little, then the indication would be that the lower pressure was adequate for the needs of the body, and that it and the pulse-rate represented a nearly normal state of the patient.

Patients should have had their pressure determined some days or hours before operation so as to get a true conception of its state and to leave time to adjust it if need be. If the pressure is found abnormally high it should be treated by rest in bed to lower it and to rest the heart, so that patients are not sent to the operating-room with a vascular system and heart under such strain that another ounce of energy cannot be produced to meet an extra call. In such instances, and in chronic cases characterized by high pressure and not complicated by acute illness or operative measures, before we institute drug treatment we must determine the new normal pressure at rest and during exercise. We must determine the power of the heart-muscle, and if possible form an idea of how much reserve energy it possesses with which to meet a sudden call, and finally by relaxing the vessels by means of rest, bathing, massage, and perhaps drugs, relieve excessive strain. We also hope to increase cardiac power by these same agencies. In other words, in all cases of circulatory disorder we should tune the circulatory system as a musician tunes his guitar by tightening one string and slackening another, and we should

not attempt to better things by tightening everything up or slacking everything off; in each case lack of harmony would develop. We should not always stimulate the heart when we stimulate the vessels, nor depress the heart when we relax the vessels. Sometimes we should stimulate the heart and relax the vessels.

I have seen many cases of vascular spasm characterized by very high tension and in a state of low tension in which the radials and other vessels felt more like veins with pulse-waves than like arteries. In other words, the vessels have undergone the dilatation from fatigue and degeneration that so often occurs in the strained and tired heart. In these cases the heart is often found hypertrophied and dilated, and beating powerfully because it has been developed to maintain a high pressure in the face of vascular narrowing, yet cannot do this in the presence of the now dilated blood-paths. For such cases I know no efficient treatment save rest in bed and massage.

In this connection the original observations of Korothow and others, as to auscultation of the brachial artery below the cuff of the sphygmomanometer, are of interest. As the cuff is relaxed and as the pulse first appears at the wrist, it will be recalled that a sharp tapping sound is heard, followed by murmurs as the pressure is still more relaxed. These disappear and are replaced by tapping sounds fainter than those which are heard at first; finally silence ensues, due to the disappearance of all sounds representing the diastolic pressure and the first-named tapping sounds representing maximal systolic pressure. The auscultatory method makes the study of blood-pressure more accurate and of some diagnostic importance. Thus, in aortic regurgitation, the first or maximal systolic tapping sound is very sharply accentuated and silence does not occur on the appearance of diastolic pressure—that is, when the relaxation of the cuff is permitting a free flow of blood. One of the best studies of this topic has recently been published by Goodman and Howell, of Philadelphia.

Leaving the subject of the blood-vessels, let me turn for a moment to some of the newer facts in cardiac physiology and pathology and discuss their bearing on treatment. It is hardly necessary to remind the medical man of to-day that the impulse which results in cardiac contraction arises at the sino-auricular node at the mouth of the great veins, and thence passes down over the auricular and ventricular walls; nor is it necessary to recall the fact that disease or injury of His's bundle at the auricular margin results in partial or complete heart-block. In partial block only every second or third auricular contraction is able to reach the ventricles and excite these to contraction. The dissociation between the heart chambers is partial. In complete heart-block there is no relation between the auricular and the ventricular contractions; each part of the heart beats independently of the other, consequently the dissociation is complete.

It is not only important to bear these facts in mind, but also to remember that the bulk of evidence seems to indicate that the influence of the vagus is exerted directly upon the auricular movements and only indirectly upon those of the ventricles. In other words, the vagi, when stimulated, slow the beating of the auricles, and as a result the number of contraction waves passing per minute, by way of the bundle of His to the ventricles, is diminished. Again, it must be borne in mind that the ventricles, although controlled by the auricles through the bundle of His, when this bundle is intact, are nevertheless capable of perfectly normal contractions if they are entirely cut off from their ordinary source of impulse. Damage to the auriculoventricular bundle is serious, not because it stops the ventricles, but because it causes incoördination between parts of the heart which are interdependent, if the normal function of this organ is to be maintained.

Turning now to the greatest of all cardiac drugs, digitalis, we may recall two important facts. The first is that it powerfully stimulates the vagi and so primarily slows the auricles and indirectly the ventricles. The second fact is that it stimulates the auricular walls themselves very little, if at all, but powerfully stimulates the ventricular walls so that they beat more forcibly, and, further, if these ventricular walls are cut off from the vagus influence by injury to the bundle of His they also contract more frequently under digitalis than before the drug is given. In a case of partial heart-block in which the ventricular contractions are only one-third as frequent as the auricular movements, because the contraction-wave only occasionally gets to the ventricles, this will result in diminishing the number of impulses to contraction that can attempt to cross the bridge made up of His's bundle, and as a consequence a dangerous slowing of ventricular action may ensue. In other words, the use of digitalis in a case of partial heart-block may precipitate a fatal attack of the Stokes-Adams syndrome. On the other hand, it is conceivable that in the presence of complete destruction of His's bundle, or complete heart-block the use of digitalis may be advantageous, because as the ventricles are no longer in the slightest degree under the control of the auricles they are increased in power and in frequency of contraction by digitalis, and thereby are able to supply the body with a greater volume of blood. Von Tabora has proved that this takes place, for he found that if His's bundle is destroyed and digitalis is given the auricles beat more slowly, but the ventricles beat faster, and thereby an approximately normal ratio between auricular and ventricular beats ensues. In other words, if the auricles in a given case are beating 150 times a minute, and the ventricles only 50 times a minute, the auricular beats may be decreased by the vagus effect of the drug to approximately 75, and through the ventricular influence of digitalis the ventricular beats may be raised to 75, and so normal equality in the number of beats would be produced. An absolute equality in rate or in time may not be positive of achievement,

but the two rates can at least be approximated. Thus, in one of Bachmann's cases 3.72 to 1 became 1.45 to 1.

Given a case of mitral stenosis in which the obstruction is not so great as to interfere seriously with the passage of blood through the mitral orifice, then cardiac rhythm is well maintained; but, if the obstruction is great, arrhythmia develops, usually in direct ratio to the failure of the auricle.

In other words, the distention and exhaustion of the auricular wall impair its ability to conduct the impulse, arising in the sino-auricular node, to the ventricle. This view is held by Mackenzie. It not infrequently happens, as Mackenzie says, that the attack of rheumatism which has damaged the valves, and so caused stenosis, also is responsible for damage to the nearby auriculoventricular bundle, or it impairs the blood-supply of the bundle by damaging the artery which supplies it. This may, on the one hand, decrease its activity, or may render it more irritable. If it is decreased in activity partial heart-block ensues. If it is rendered more irritable when the contraction-wave starts, not in the sinoauricular node but in the auriculoventricular node, in accordance with the law that the contraction-wave starts at the most excitable part of the primitive cardiac tissues. This gives rise to the so-called "nodal rhythm," in which the ventricle starts to contract a fraction of a second before the auricle—that is to say, the normal sequence is reversed and the function of the heart seriously impaired. As digitalis stimulates part of the heart we may develop by its use in a case of nodal rhythm excessive ventricular systole, and so increase the difficulty.

As long ago as 1872, that most acute clinical observer, the late Dr. Mahomed, of London, called attention to the fact that in mitral stenosis there is a delay in the occurrence of ventricular systole after auricular systole, and, as is pointed out by Thomas Lewis in the *Quarterly Journal of Medicine* for July, 1909, Galabin in 1875 published cardiograms actually showing this delay. These observations have been confirmed in recent years by Mackenzie, Herringham, and Hay, and indicate that partial or complete heart-block may develop in mitral stenosis. It is readily understood that certain physical signs may render it imperative that we should be most cautious in our use of digitalis in mitral stenosis. Thus, the disappearance of the presystolic mitral murmur in severe mitral stenosis is undoubtedly due to the inability of the auricle to drive the blood past the obstruction, or, in other words, to a greater or less degree of paralysis of the auricular wall. One of the reasons for believing this to be the case is that with the disappearance of the murmur a jugular pulse develops which is synchronous with the contraction of the ventricle. Some consider that this jugular systolic pulse is the direct result of the contraction of the right ventricle, but Mackenzie and others think it results from a simultaneous contraction of the right auricle and right ventricle. Whatever may be the cause of this jugular pulse, which is

systolic in time, the cardiac function is upset and a state not unlike that which obtains in the Stokes-Adams syndrome obtains, viz., delay in the passage of the contraction-impulse from the sinoauricular node over His's bundle, or, in other words, a state closely allied or equivalent to partial heart-block with jugular pulsation. In other cases a state is produced like that of nodal rhythm.

The therapeutic lesion would therefore seem to be that digitalis in mitral stenosis, with incoördination between the auricle and ventricle, may be a very dangerous drug, since by its power of diminishing auricular contraction through vagal stimulation, and its inability to increase the power of the auricular wall, it may increase the danger of auricular distention by retained blood and so paralyze this part of the heart. In other words, it may actually decrease the power of the auricle to empty itself into the ventricle. As Mackenzie well says, if there be depression of one function of the heart, vagus stimulation is liable to seize upon that function and increase the depression, presumably through its vagus influence. Furthermore, this tendency to distention of the left auricle is aggravated by the fact that the digitalis stimulates the right ventricle to drive more blood into the left auricle, thereby still further distending that cavity. Lewis states that digitalis has been proved, by observations made with instruments of precision, to increase partial heart-block, and Mackenzie on p. 186 of his well-known book (2nd ed.) states that the fact that vagal stimulation may be an important factor in the production of heart-block is not to be forgotten. This view is held by Mackenzie and has been proved by a number of investigators, particularly Roy and Adami. In conditions in which the cardiac conductivity is decreased there seems to be little doubt that digitalis still further impairs it. Mackenzie goes so far as to state that he always makes it a rule to stop the use of digitalis in a case of stenosis as soon as he finds the pulse is dropping a beat.

From the facts already stated the following deductions would seem to be correct and important:—

Given a patient suffering from circulatory failure due to mitral stenosis, it is our duty not only carefully to weigh the import of the tumultuous cardiac sounds, but by the use of instruments of precision to determine, if possible, whether there is delay in the transmission of the contraction-impulse over His's bundle. If such a delay exists in doses large enough to cause distinct and sharp cardiac effect, it is probably capable of prolonging this delay and so doing harm. If in addition to this delay there is a jugular pulse synchronous with ventricular systole, digitalis is still more contra-indicated, as it will impair the action of the left auricle, and will still further distend it by stimulating the right ventricle. If given at all, the dose of digitalis must be so small as to produce a very gradual effect, one which will not consist in decreasing auricular contraction through vagal stimulation, but gently reestablish general cardiac

power. In other words, here is another instance in which the question of a proper dose is as important as the choice of the proper drug. The question naturally arises, If not digitalis, what else? The answer would seem to be that in such a case as that just described we should give the patient absolute rest, unload the portal system by free purgation, use venesection, it may be, to relieve stasis, and give rapidly-acting diffusible stimulants for a few hours until the coördination of cardiac movement is reëstablished. When this is done then small doses of digitalis, arsenic, and iron may be used to restore cardiac tone.

In concluding this paper let me hope that I have not wearied the readers with facts already familiar. If they have been too familiar to have been interesting, they will at least have served the purpose of impressing upon all physicians, particularly upon the younger ones, the need of constant study of the complex problems of physiology and pathology, and their bearing on successful treatment. Last of all they may serve to refresh the weary practitioner in that they show that the practice of medicine is not a laborious grind, but a means by which we can earn a living and still wander as true scientific students in ever new and developing paths of original investigation.

AUTOSEROTHERAPY: THE THERAPEUTIC USE OF THE PATIENT'S OWN SEROUS EXUDATES AND TRANSUDATES.

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The widely varying experiences of other men and the contradictory results I have obtained have led me to think it worth while, in accordance with the promise in my previous paper,¹⁷ to review and tabulate all available cases from the literature. 'I desire also to add further cases of my own.

The whole procedure of autoserotherapy, in the treatment of collection of fluids in serous cavities, is an extremely simple one. It consists in the reinjection, hypodermically, of small quantities (1 to 10 c.c.) of the serous exudates or transudates withdrawn from the pleura or peritoneum. The aspirating needle instead of being withdrawn completely as usual after an exploration is withdrawn only as far as the subdermal tissues, and the fluid previously aspirated is injected under the skin without a second puncture. The almost unanimous verdict, of all those who have employed it, is that the method is entirely without danger and usually without systemic reaction. Introduced by Gilbert¹² in 1894 it has received attention from a number of French, Italian, German and Russian clinicians. As far as I have been able to find my report was the first in an American journal.

Gilbert, according to Tschigaeff,²⁹ received the stimulus to the use of his method from an observation of Debove and Remonde who used intra-abdominal injections of sterilized boric acid in tuberculous peritonitis and then used 5 c.c. of the peritoneal exudate causing a rise to 39° C. They considered tuberculin to be present in the peritoneal fluid. Gilbert considering the tuberculin in the exudates to be very dilute determined to use the exudates without dilution in the treatment of tuberculous pleurisy. He reported 17 cases of this kind in which the exudate was reabsorbed in six to ten days after a single injection in most cases. In only 13 cases was a repeated injection necessary.

In 1896 Scarpa²⁴ is said to have tried the method in 9 cases with favorable results. This article was not available to me for review.

In 1898 and 1899 Mongour²⁰ reported to the Medical and Surgical Society of Bordeaux 2 cases of tuberculous pleurisy. The first one was of hemorrhagic type of long standing, and was cured in nine days after

three injections of 2, 3 and 4 c.c., respectively. The second case, one of simple serous tuberculous pleurisy, also of long standing, was treated by reinjections of 10 to 15 c.c. every four or five days. The general condition improved enormously but the injections were without influence upon the local condition.

Tschigaeff,²⁹ in 1900 and 1903, reported 8 cases, of which 3 were probably tuberculous, in which he claimed to have had uniformly favorable results. The temperature was raised in all cases by the injections and after chills occurred. In some cases there was dyspnea. Resorption began sometimes immediately after the injection, sometimes only after one or two days. Diuresis was always increased. The time necessary for a cure was dependent on the period of the disease in which the treatment was begun. If it was begun in the first weeks of exudation the cure took ten to twelve days. If begun three or four weeks after the beginning of the illness the cure took two or three weeks. In some cases the withdrawal of 5 c.c. and the reinjection of 1 c.c. caused the diuresis to increase from 750 c.c. to 1100 c.c. or from 900 c.c. to 1900. The general improvement was great. Vieryuzhski,³⁰ who was consultant in the Nicholas Military Hospital where Tschigaeff conducted his experiments, did not hold the same roseate opinions of the latter's results. He considered the method not without danger. In three cases the temperature rose and remained high for weeks. He believed the autoserotherapy, being a modified tuberculin treatment, should previously be tried out on animals.

Donzello,⁵ in 1904, treated 5 patients by the withdrawal of 5 c.c. of the pleural effusion and the immediate reinjection of 3 c.c. under the skin of the arm. All the patients recovered, but in one it was necessary to do a thoracentesis owing to serious complications on the part of the lungs.

In 1904 Stasevich,²⁶ influenced by the work of Tschigaeff, tried the method in 20 cases of undoubted tuberculous pleurisy. He found that the level of the effusion was not reduced to such an extent nor so rapidly as to warrant the assumption that the injection had a quickening effect upon the absorption. The general condition of the patient remained the same. The temperature always rose after injection, but no injurious local nor other phenomena were observed. The urine had increased in amount, but not to the extent claimed by Tschigaeff; usually from 700 c.c. to 800 c.c. or from 1800 to 2000 c.c.

Geronzi¹⁰ reported in 1905, 8 cases of pleural effusions, all probably tuberculous, treated with autoserotherapy. All showed prompt and marked improvement. Two of the patients had also abdominal accumulations; in one of these the ascites was favorably influenced, in the other the influence of the injections was not so great on the ascites as upon the pleural fluid.

The series of cases reported by Jovane¹⁶ in 1905, is extremely interesting. All the patients were children. The youngest, four months old,

who had a serofibrinous pleurisy (non-tuberculous?), died twenty-eight days after puncture. Four other children, three to five years old, with exudative pleurisies (one certainly tuberculous) showed prompt improvement. In the first case recovery occurred in twelve days. The second case was that of the four months' old baby noted above. In the third case complete resolution of the pleuritic process occurred, but death occurred later due to bronchopneumonia. Complete resolution took place in the fourth case, but the condition of the patient was unfavorable on account of an abdominal tuberculosis. In the fifth case the absorption of the pleuritic effusion occurred in a short time. Jovane also tried the method in cases of ascites. In one case of uncomplicated ascites (tuberculous?) in a child of five years, the rapid absorption of the fluid was complete in thirteen days after the injection. His other 3 cases had ascites in conjunction with pleuritic accumulations. Of these, 2 recovered rapidly, the third died ten days after the injection. Jovane concludes that autoserotherapy is a therapeutic measure which deserves a trial in cases of exudates, not only pleural and peritoneal, but of any other variety. He thought that it was necessary to establish its value in tuberculous and non-tuberculous cases, and that the method was more applicable to acute than to chronic cases, as in the latter the cachexia is usually profound and the patient fails to react. Sometimes he observed an increase of temperature on the days following injection. He noted a constant increase in the urine.

Fifteen more cases were contributed to Jona¹⁵ in 1907. In these the fluid was absorbed in six to twenty-four days. In all, save two, the injections were followed by increase in urinary excretion, excitation of which function Jona considered to be the method of their action. Nine were cases of tuberculous pleurisies, one a traumatic.

Carletti³ tried a modification of the method in twelve cases of pleurisy. He aspirated the fluid, set it aside at blood temperature to allow autolysis to proceed and then reinjected it later. He thought his results with this technique were better than the Gilbert technique, but did not consider them very favorable even with this.

Fede⁸ treated 5 patients by withdrawing 1 c.c. of the pleural effusion and reinjecting this at some other point. This was repeated three times on three successive days in acute cases and the results were excellent. In more chronic cases up to 4 c.c. or more were used. No reaction, local or general, occurred except in one case of tuberculosis, and in this the prostration and rise in temperature subsided during the night. The reaction in the tuberculous cases and its absence in the other cases, Fede suggests, might be used as a point in differential diagnosis.

Fontana,⁹ in 1908, reported 9 cases treated according to Gilbert's method, modified in that in some cases the fluid had first to be entirely evacuated and reinjections were then practised. In 3 cases the pleuritic fluid disappeared promptly and rapidly after a single injection

without evacuation. In 5 other cases the fluids were removed as above stated and the reinjection performed. Recovery was prompt in all. In the ninth case a previous evacuation without autoserotherapy had been followed by a speedy reaccumulation, whereas treatment with autoserotherapy brought about a prompt diminution of the pleural exudate and recovery. Fontana considered the method of true therapeutic value in pleurisies whether tuberculous or not, but believed that it had a greater curative power when associated with thoracentesis. When intervention was done early, independent of the cause and nature of the disease, he believed the cure was obtained very quickly. In his opinion the method had no value in differential diagnosis.

Zimmermann³¹ has recorded 8 cases, 6 successful, 2 unsuccessful. The latter were one case of carcinoma of pleura and one case which later turned out to be empyema. Zimmermann noted a marked diuresis following the injections. He thought the results were due to a short-lived leucocytosis.

The most valuable series recorded is that reported by Marcou¹⁹ in 1909. This author used the method in 82 patients during four years. He claimed that all were cured. Only in one single case was it necessary to evacuate the fluid; in all others the autoserous injections were sufficient. He had watched these patients for two, three and four years after the injections and found that the fear of a generalized tuberculous infection was groundless. The results of the treatment he observed were: (1) Slight evanescent rise of temperature the evening of the day on which the injection was made; (2) increased diuresis; (3) gradual disappearance of the fluid. His theory is that an "antiserose" (antipleuritic substance) is formed which causes the absorptions. He used the method in all cases of pleurisy with effusion and hydrothorax, no matter what the cause; the only condition being that the fluid must not be purulent.

Schnutzgen²⁵ also tried autoserotherapy in a wide range of conditions. His statistics have the further value that his results were checked by x -ray examinations and by exploratory punctures after apparent cures. His cases include hemorrhagic and even beginning purulent pleurisies, hydrothorax, ascites, hydrothorax with ascites, pericarditis. Of this group (number of cases not stated) all were failures save two. These two were as follows: 1. Pleuritis exudativa sinistra. Pericarditis. Myodegeneratio cordis. Ascites (slight) Edema. In this case theocin was administered by suppositories simultaneously with the injections. 2. Bronchitis diffusa chronica. Hypertrophica cordis sinist. Polyserositis (hydrothorax). Prolapsus uteri totalis. Two injections with complete disappearance of hydrothorax. He also employed the method in 15 cases of serofibrinous pleurisies, 11 tuberculous and 4 non-tuberculous. 14 were successes. In the other case evacuation had to be performed on account of dyspnea on the seventh day, but Schnutzgen thought that this one too would have been a success could he have waited.

Szurek²⁷ has reported 9 cases of autoserotherapy. Of these 8 were tuberculous serofibrinous pleurisy, and one was a leukemia with pleural, pericardial and peritoneal effusions. He used from two to ten injections, each 1 or 2 c.c. every three days. The case of leukemia was not influenced. Of the tuberculous cases one was small, one was moderate, and the rest were large collections. All were old effusions and no longer increasing with one exception. In 3 cases the effusion entirely disappeared. In 2 cases there was improvement but not complete disappearance of the fluids. In 2 cases there was no result.

Dodal⁴ has reported 17 cases of autoserotherapy of pleural accumulations with the following results. 3 cases had to be evacuated after one injection because of threatening symptoms. The other 14 he considered successful as follows:—

Complete cures.	4
Good results.	4
Satisfactory results.	2
Partial results.	4

He does not explain his qualifying terms.

Dodal noted an increased diuresis. He found that the temperature and general conditions were favorably influenced and that the exudates disappeared promptly, in some cases after a single injection. In tuberculous cases there was a rise of temperature. He attributed the results to the action of antibodies.

In 1910 Levy-Valensi and Pouzin¹⁸ reported 7 cases of pleural effusion in which they took out amounts of fluid varying from 10 to 20 c.c. *None was reinjected.* In 5 instances the remaining effusion began to be absorbed quickly so that the signs had almost disappeared in a week. In 1 of the 2 unsuccessful cases the withdrawal of 500 c.c. of fluid was shortly afterwards followed by a reaccumulation. On the other hand, where absorption followed exploratory puncture the fluid never returned.

Audibert and Monges,¹ in 1910, treated a case of ascites of hepatic origin with twelve injections of the ascitic fluid at intervals of six days, beginning with three c.c. and never exceeding ten c.c. There was no pain, no local reaction nor any apparent influence on the temperature or elimination of chlorides and urea. The main effect was a copious and persistent polyuria which brought about a notable improvement. The circumference of the abdomen decreased from 94 cm. to 87cm. They also withdrew salt from the diet, but they did not think that the result could be attributed to this. The patient had previously been tapped every fifteen days for six months.

Later in 1910 Roque and Cordier²² reported 6 more cases of autoserotherapy in ascites. The results were not encouraging. Their cases were as follows:—

1. Cancer of stomach. Cancerous ascites.....Failure
1. Peritoneal tuberculosis (osseous and glandular tuberculosis in addition).....Failure
3. Laennec cirrhosis; 1 favorable; 1 failure; 1 indifferent
1. Mitral regurgitation. Edema. Ascites.....Failure

Ebler⁶ (1910) has adopted an interesting modification of the method. He treated a case of tuberculous peritonitis making a permanent fistula leading from the peritoneal cavity to the subcutaneous tissues through the separated recti. The skin incision was closed tightly. The ascites was thus drained and absorption induced by continuous autoserotherapy. The patient improved rapidly, gaining twenty-five pounds. There was no return of the ascites.

As far as I have been able to determine my own cases¹⁷ were the first recorded in English or American literature. I give a brief synopsis of these here:

Case 1.—A. S. Mexican, male; twenty-nine years old. Acute pleurisy (left) with effusion to level of eighth rib posteriorly. Grocco's triangle on right side, apex reaching to three inches from vertebral column. Autoserotherapy on eleventh day of disease. 15 c.c. of straw-colored fluid withdrawn and 7½ c.c. reinjected. No local nor general reaction. Complete disappearance of effusion four days after injection.

Case 2.—J. C. L. White, male, nineteen years old. Laborer. Chronic parenchymatous nephritis with general anasarca, ascites and hydrothorax (left). Previous therapeutic effort without avail. Autoserotherapy (7½ c.c.). No local or constitutional reaction. Immediate and very marked increase in diuresis. Disappearance of hydrothorax and edema within three days; slightly slower disappearance of ascites.

Case 3.—G. D. S. White, male, fifty-eight years old. Hepatic cirrhosis (Laennec) with ascites of eight years' standing. Repeated tapping for extreme ascites during first few months, then Talma operation, following which eight years of comparative comfort, but with persistent ascites. Repeated autoserotherapy (three injections of 5 c.c. to 10 c.c. at intervals of three or four days) was followed by diarrhea, but no increase in diuresis. Due to the diarrhea ascites diminished and the circumference of the abdomen decreased from 91.2 cm. to 84.25 cm.

To these I may add the following new cases:—

Case 4.—W. B. White, male, forty-seven years old. Laennec cirrhosis of liver. Ascites. Edema of legs. Tapped twice previously with recurrence. Urine measured before experiment=2 quarts in 24 hours (May 13th, 1910). Greatest abdominal circumference 95.5 cm. (10 cm. above umbilicus). Level of fluid (standing) 8 cm. above umbilicus. Autoserotherapy, 4 c.c. withdrawn and 2 c.c. reinjected. Temperature 98 3/5° F.

May 14th. No reaction constitutional or local.

May 16th. Urine, four quarts daily; two stools daily. No medication of any sort.

May 24th. Urine, four quarts daily; intake of fluids, water, ten ounces, milk, one quart daily. Patient vomited large quantity of blood. May 23rd. Ascites practically gone. Abdominal circumference 81.25 cm.

Case 5.—J. W. Colored, male, thirty-eight years old. Cirrhosis of liver. (Laennec? Syphilis?) Autoserotherapy repeated three times. October 10th, 1910, 5 c.c.; October 12th, 5 c.c.; October 17th, 10 c.c. No reaction. No influence whatever on ascites.

Case 6.—D. D. Colored, male, thirty-four years old. Laborer. Consolidation of both apices; no rales. Pleural effusion of right side reaching to level of spine of sixth dorsal vertebra. Grocco on left to level of spine of ninth dorsal vertebra. No cough or fever. No T. B. in sputum. Autoserotherapy two months after beginning of pleurisy (pain in side).

Autoserotherapy. November 26th, 1910, 12 c.c. withdrawn and 5 c.c. reinjected.

December 10th, 1910. 10 c.c. withdrawn none reinjected on account of faulty needle.

December 15th, 1910. Autoserotherapy 10 c.c.

December 29th, 1910. Autoserotherapy 5 c.c.

January 5th, 1911. No change in condition. Withdrawal of one pint of straw-colored fluid from right pleural cavity.

CONCLUSIONS.

In view of my limited experience with autoserotherapy I do not feel qualified to draw any definite conclusions as to its value. The striking diuretic effect in cases 2 and 4 has not failed to impress me as other investigators have been impressed by similar experiences. It seems to me that were there no other problem involved this one would be worth further investigation—namely, Why and how should the hypodermic injection of a patient's own serum stimulate diuresis? It is to be noted that the diuresis was caused in these two cases (and in many other cases in the literature) by the injection of a simple transudate (non-inflammatory). I am inclined, therefore, to agree with those authors who attributed the beneficial effect of the injections to the increased output of urine. At any rate, we must agree that this must be the case in the non-inflammatory cases. The original basis for autoserotherapy, that is, that the pleural exudates contain tuberculin would hold good only for tuberculous cases. In cases of pleurisies due to other infections we might, in line with this theory, assume that the exudates contain suitable antibodies and that the good results might be due to these. In this connection the greater value of autogenous vaccines over heterogenous vaccines is to be remembered. Browning² in a theoretical paper in 1905 advocating the use of the patient's own serum (not obtained from exudates or transudates) points out that the procedure has a rational basis when explained

by the side-chain theory. He instances the experiments of V. Jez (who treated 10 cases of erysipelas with serum (5 to 10 c.c.) obtained from blisters produced on the bodies of the patients themselves. This was said to be followed by a rise in temperature and a rapid improvement of all the symptoms.

Finally, I may say:—

1. The method is simple and without danger.
2. There is still available only insufficient evidence as to its value and its mode of action.
3. At least two problems are presented in its study:
 - (a) Is its action a reaction of immunity?
 - (b) What causes the diuresis and how?

Investigator.	Where Quoted.	Number of Cases	Successes	Failures	Remarks.
Gilbert (Original)	Tschigaeff	17	17	0	All tuberculous pleurisies.
Gilbert (2nd report)	"	10	10	0	" " "
Bourget	"	4	4	0	" " "
Andreae	"	1	1	0	" " "
Maillard	"	1	1	0	" " "
Scarpa	"	9	9	0	" " "
Mongour and Gentes	"	15	3	12	11 positively tuberculous; 4 probably tuberculous.
Mongour and Gentes	"	4	4	0	Non-tuberculous.
Tschigaeff	"	8	8	0	3 probably tuberculous.
Fede	Szurek Schmidt Jahr 1898.	5	5	0	1 tuberculous.
Szurek	Szurek	8	3	3	2 doubtful results. All tuberculous.
"	"	1		1	Leukemia.
Schnutzgen	Schnutzgen	15	14	1	Sero-fibrinous pleurisy of 14 successes, 11 tbc., 3 non-tbc.; 1 failure, non-tbc.
"	"	?	1		Pleurisy, pericarditis, myocardial degeneration. Ascites. Edema. Also used Theocin by suppository.
"	"	?	1		Polyserositis (Hydrothorax) Chr. Bronchitis. Cardiac Hypertrophy.
Marcou	Marcou	82	82		
Mongour	Mongour	2	1	1	Tuberculous pleurisy.
Donzello	J. A. M. A. Jan. 2, '04	5	4	1	
Stasevich	Stasevich	20		20	Absorption not hastened by injection. All tuberculous pleurisies.
Tschigaeff 2nd series.	Stasevich	8	6	2	
Geronzi	Geronzi	8	8		All showed immediate marked improvement. Probably all tuberculous.

Jovane	Jovane	5	5	1	1 death. 1 tuberculous pleurisy. 4 sero-fibrinous, possibly none tbc.
Jovane	Jovane	4	3	1	1 death. Tuberculous peritonitis, ages 3-8.
Jona		15	15	0	9 tuberculous pleurisies. 1 traumatic pleurisy.
Carletti		12		12	Unfavorable.
Fontana	Fontana	9	3	6	He counts all successes although evacuation had to be done in 6 cases. 2 tuberculous, others uncertain.
Enriquez and Weil		3	3 (?)		Not available. .
Zimmermann	Zimmermann	8	6	2	2 failures were 1 carcinoma of pleura, 1 case later empyema.
Roque and Cordier*	Roque and Cordier	6		6	Glandular tuberculosis, Mitral regurgitation. Laennec cirrhosis (3 cases). Cancer of stomach.
Dodal	Dodal	17	14	3	4 good, 4 satisfactory, 4 partial results. 4 complete cures.
Audibert and Monges	Audibert & Monges	1	1		Hepatic ascites.
Lemann		6	3	3	3 hepatic ascites. 1 tuberculous pleurisy. 1 sero-fibrinous pleurisy acute. 1 chr. parenchymatous nephritis with polyserositis (hydrothorax and ascites).
		309	232	75(a)	

*All Ascites.

**To this must be added 2 doubtful cases of Szurek's.

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THE PRESENT STATUS OF PNEUMONIA.

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Regarding a book, it was said in the presence of Lessing that it contained some things that are true besides much that is new. Lessing replied: "Yes, that is so, but it is a pity that that which is true is not new, and that which is new is not true."

In looking over the extensive literature of pneumonia, I am led to conclude in the words of Lessing—namely: "That which is true is not new and that which is new is not true." In substantiation of this conclusion, I refer you back many centuries to Aretimus who so splendidly described the disease, and to Hippocrates and the old Greek physicians who were at that time very familiar with the disease.

Comparatively little has been added to the study of physical signs and to the description of the morbid anatomy since Laennec's masterly work in 1819. A more recent advance was the discovery of the cause of the disease, micrococcus lanceolatus, by A. Fraenkel in 1884.

Of all the acute infectious diseases, pneumonia is the most fatal, and ranks next to tuberculosis as a cause of death. In order to fully appreciate its ravages, it is well to compare it with other infectious diseases.

Consumption, during the census year 1900, claimed 111,059 victims in the United States alone; pneumonia was a close second, with 105,971 deaths; other infectious diseases as a cause of death, expressed in round numbers, were as follows:—

Diarrheal Diseases.	47,000
Typhoid Fever.	35,000
Cholera Infantum.	26,000
Influenza.	17,000
Diphtheria.	16,000
Whooping Cough.	10,000
Septicemia.	7,000
Scarlet Fever.	6,000
Meningitis.	4,000

An infectious disease ordinarily means a preventable disease. The following record shows what preventive medicine has done for the various infectious diseases in the United States since 1890. The death-rate from consumption has decreased 54.9 per 100,000; diphtheria, 52.5; cholera infantum, 31.9; diarrheal diseases, 19; typhoid fever, 12.5; malaria, 10.4; whooping cough, 3.1; and scarlet fever, 2.7. These factors largely

contribute to the prolongation of the average human life from 31.1 in 1890 to 35.2 in 1900. The same relative increase has continued during the past decade, and it is estimated that the present average is between thirty-eight and forty years, which is just twice the average length of human life in the sixteenth century.

The steady decrease in the death-rate and increase in the average prolongation of human life has been accomplished largely by the introduction of simple measures. Thus, tuberculosis has been checked by improvement in methods for early diagnosis, disinfection of sputum and education as to the therapeutic value of sunshine, fresh air and food. Typhoid fever, by the purification of the water and milk supply, proper nursing and disinfection. Diphtheria, by disinfection and serum. Scarlet fever, by isolation and disinfection. Diarrheal diseases by proper feeding and sterilization. Malaria and yellow fever by the annihilation of the species of mosquitos causing these diseases, and epidemic meningitis by the recent discovery of Flexner's serum.

What part does pneumonia play in this onward march of progress? It is sad to relate that this disease, which kills more human beings than typhoid fever, diphtheria, scarlet fever, influenza, whooping cough, septicemia and meningitis combined, is allowed to run rampant. The profession has not succeeded in checking its fatal influence; on the contrary, it is said to be on the increase.

The question may be asked what is being done to combat the fearful onslaught of the disease? It is a sad commentary to have to acknowledge that as far as measures are employed to prevent pneumonia, we are not even using the equivalent of the three R's in the most elementary school training. These equivalents, I consider, are Education, Isolation and Disinfection. I believe the time is coming when these methods will be employed in pneumonia just the same as we employ them now in tuberculosis, typhoid fever and diphtheria.

These facts are appalling, and should naturally lead one to inquire into the mode and character of infection in pneumonia.

The organism, *micrococcus lanceolatus*, was first discovered in 1880 by Surgeon-General Sternberg by inoculating rabbits with his own saliva. Four years later, A. Fraenkel found that this same organism was the most frequent cause of pneumonia. One must bear in mind that pneumonia is only one of the many effects produced by this organism. It occurs in the mouth of about 50 per cent. of normal individuals, and is found relatively more frequent during the midwinter months.

Darling found the organism in the accessory nasal sinuses in 92 per cent. of autopsies on patients who had died of pneumonia. He also found pneumococcus sinusitis in 28 per cent. of control cases, in none of which death was due to pneumococcus infection. Pneumococcus sinusitis also coexisted in thirteen cases of pneumococcus meningitis examined. In all of these cases, the character of sinusitis indicated that it was

an antecedent infection. Darling came to the conclusion that in such diseases as pneumonia, pneumococcus meningitis, endocarditis, etc., the organisms find their portal of entry through these infected sinuses.

Since the germ is found in the mouth of perfectly healthy individuals, we may conclude that other factors must come into play before the disease can be produced. We may therefore assume that in addition to the presence of the specific organism there are some other exciting factors or individual predisposition. The latter may be found in the debilitating influence of alcohol, poor nutrition and bad hygienic conditions. The exciting factor is frequently a cold or it may be a bronchitis, either simple, or secondary to influenza, whooping cough, etc.

The disease is unquestionably communicable. Many epidemics of pneumonia as well as other pneumococcus affections, such as conjunctivitis, have been reported.

In 1907, I had the opportunity of studying an epidemic in Baltimore which closely resembles gripe. It was characterized by severe catarrhal symptoms of the upper air passages with a tendency to membranous exudates on the nasal and pharyngeal mucous membrane and a mucopurulent conjunctivitis. Dr. Stokes, who made a bacteriological study, found the pneumococcus to be the cause of this epidemic. We reported fifty-six cases in all; most of which were cases occurring in house infections. Upon careful inquiry, it was ascertained that this particular epidemic was not confined to Baltimore, but prevailed extensively in many of the larger communities in the Eastern States.

Dr. Fabyan (*Johns Hopkins Hospital Bulletin*, Nov., 1907) gives a splendid resumé of epidemic pneumonia with a report of 5 cases occurring in one family in Baltimore. Epidemics in ships and prisons are not uncommon. Tyson describes an epidemic in which more than half of the members of a crew were attacked in rapid succession. Out of the crew of eight hundred and fifteen men, one hundred and ten developed the disease, and those transferred to the hospital communicated the disease to some of the inmates. It is not an uncommon occurrence for a nurse to contract the disease from a patient or for new cases to develop from existing pneumonia in hospital wards.

Symptoms.—As a rule, a true case of croupous pneumonia runs a typical course and is self-limited. We are still in doubt as to the period of incubation, but in all probabilities it is brief. Prodromal symptoms are exceptional. If they do occur, they are in the nature of a catarrh. The onset is abrupt. The first symptom is usually a severe, prolonged chill, lasting sometimes for one hour. A rise in temperature quickly follows or it may rise coincidentally with the chill. At the beginning, the patient has the appearance of being very ill. There are a number of symptoms which as a composite make a very characteristic clinical picture of pneumonia. So much so, that it has been my practice to send students through the wards to diagnose pneumonia by mere inspection; and it is surpris-

ing with what success they meet. This characteristic group of symptoms includes the active position of the patient, the respiratory distress, the expiratory grunt, the anxious expression, the bright eyes, the dusky, cyanotic face with circumscribed flushing of one or both cheeks, the dilating nostrils, the herpes, the dry, suppressed cough together with the tenaceous, rusty sputum.

The following symptoms deserve special consideration:—

Temperature.—The rise is rapid, reaching the fastigium within twelve to twenty-four hours. In childhood and old age, it is less rapid and apt to be more irregular. It usually runs a regular course of continuous type of fever until the crisis is reached. There is occasionally a pre-critical rise of a degree or more, or there may be a drop of a degree or two in what is known as the pseudo-crisis. In delayed cases and in children the defervescence is often by lysis.

A temperature of 103 or 104° F. is not an unfavorable sign in pneumonia as it means a reaction. In the gravest forms, as in the aged and alcoholics, the rise in temperature may be very slight, and indeed they may run an afebrile course.

Pain.—The parenchyma of the lung is not supplied with sensory nerves and therefore no pain occurs in central or deep seated pneumonias. The pain indicates an associated pleurisy. It has the same stitch-like, lancinating character that one finds in simple pleurisy, and is aggravated by deep breathing and cough. If the diaphragmatic pleura is involved, the pain is referred to the epigastrium or the region of the appendix. Cases of this kind have been frequently diagnosed appendicitis and some of them have been operated upon. Ten cases, in which an operation was performed with two deaths, have been reported.

Dyspnea.—Respiratory movements are shallow and hurried, and usually accompanied with an expiratory grunt. There are cases however, in which pain, cough and dyspnea are singularly absent. These cases occur most frequently in the masked pneumonia of drunkards, the aged and the terminal pneumonias of chronic exhausting diseases. The factors concerned in the production of dyspnea and toxemia, fever and arrested function on account of lung consolidation.

Cough.—Early in the disease, the cough is hard and dry, due to pleural irritation. Later, it is moist and productive. It is nearly always associated with pain. At the time of crisis, the cough becomes loose and the expectoration free.

Physical Signs.—There are certain signs which are frequently misinterpreted, and therefore lead to error in diagnosis. The following are among the most important:

1. Sometimes in the most extensive consolidation, as in massive pneumonia in which the bronchial tubes are filled with exudate, tactile fremitus is diminished or may be entirely absent. Vocal fremitus and tubular breathing are similarly modified. The character of the signs may change after forced cough.

2. When a patient is lying on one side, there is a contrast which occurs normally in the percussion note of the two sides.

3. In the early stage, breathing is often quiet and suppressed, not unlike pleural effusion. This sign is suggestive, and should put one on his guard.

4. The fine crepitation occurring in the early stages of the disease at the end of inspiration, is probably a fine pleural crepitus, instead of crepitant râles.

5. Tubular breathing is caused by the laryngeal and bronchial sounds being conducted through a consolidated area. It does not occur if the larger tubes are filled with exudate.

6. To differentiate between pleural friction and bronchial râles, have the patient cough. If they are bronchial in origin, the râles explode and the character changes.

7. We may have a central pneumonia without physical signs. The diagnosis is largely made from the character of the cough, expectoration and sputum.

Circulatory Symptoms.—The heart was not considered such an important factor in pneumonia until 1874, when von Jürgensen called attention to the fact that the danger to life first threatened the heart and that death was due to cardiac insufficiency. This insufficiency is brought about by the increased resistance in the pulmonary vessels, which increases the work of the right heart, and the toxic albuminoids which are produced by the metabolic activity of the pneumococcus. The latter is directly injurious to the myocardium. Thus the heart becomes more readily exhausted, and this exhaustion diminishes its power to overcome the pulmonary resistance, hence the dilatation. This was regarded as the most common cause of death in pneumonia until Pässler's studies and observations were reported a few years ago. Clinicians of to-day agree generally with Pässler that the most common cause of death, as far as the circulatory apparatus is concerned, is a paralysis of the vasomotor centre in the medulla oblongata.

These two circulatory disturbances present entirely different clinical pictures, and call for entirely different lines of treatment. Forcheimer describes them as follows: "In cardiac insufficiency, the patient is cyanotic; there is great dyspnea; increased activity of all the obligatory as well as accessory respiratory muscles, and all the other evidences of dyspnea are present. On examination we find the jugular veins overfilled, the movements of the heart very much increased, especially those of the right ventricle; on percussion there is an increased heart dulness to the right from 1 to 3 cm.; on auscultation there is accentuation of the second pulmonary sound which disappears as the case progresses. Frequently edema of the lungs is also found. The liver is usually enlarged; when the condition lasts for over twenty-four hours it is very much enlarged. The patient dies in asphyxia—never in collapse, unless this condition is com-

bined with vasomotor paralysis. The first evidences of vasomotor paralysis are rapidity of heart and sinking of blood-pressure; with this, or shortly afterward, there comes tympanites; the patient then presents an exsanguinated appearance, with beginning evidences of collapse; the pulse becomes irregular, empty and so rapid that it cannot be counted; symptoms of cerebral anemia begin to appear—delirium, hallucinations, sometimes great restlessness; they gradually disappear to be superseded by stupor and coma; the collapse increases; the heart becomes more irregular; the heart sounds disappear, and the patient dies.”

One should never fail to listen to the second pulmonic sound. An accentuation of this sound is a favorable sign. When it becomes less audible, it signifies impairment of the right heart. In early childhood, this rarely occurs, owing to the fact that the right heart is relatively more developed at birth than the left.

The blood-pressure is usually low in pneumonia and a sudden drop is a serious omen, and means death. A slow gradual decrease of 20 mm. or more indicates cardiac asthenia and calls for stimulation. The toxicity of the blood is increased.

The pneumococci are demonstrable in the blood in nearly all cases, frequently appearing before the physical signs. They generally disappear from the blood as soon as the fever subsides, but they have been found to persist for fifty-six days. In most cases of pneumonia, a marked leucocytosis is present, numbering from 12,000 to 40,000 per cm. The increase is usually in proportion to the rise in temperature. A leucocytosis, like fever, indicates a reaction and represents the degree of defence against the invading pneumococci. In malignant pneumonia, leucocytosis may be absent. The coagulability of the blood is increased. This is probably due to an increase in the fibrin ferment, the result of an extensive disintegration of the leucocytes.

Nervous Symptoms.—Headaches are common, and convulsions are frequent in children. There is a type of pneumonia, occurring in children, known as the cerebral type, which is characterized by high fever, headache, convulsions, delirium, tremors, and perhaps rigidity of the neck. Such cases are frequently diagnosed as meningitis. Alcoholic patients frequently develop delirium tremens, others maniacal symptoms or uremic symptoms. Apex pneumonias are more apt to be associated with delirium than basilar pneumonias.

TREATMENT.

“The great instruments to be employed in the treatment of inflammation of the lungs are blood-letting, tartarized antimony and mercury; of these blood-letting is the chief.” This statement is quoted from Watson’s “Practice,” 1845. In the light of modern therapy, this seems quite obsolete, yet it is doubtful whether the results to-day are better than they were in

the days when every patient suffering with pneumonia had to be bled.

If rational therapy is to be employed, prophylactic measures must be instituted. The reason for this is plainly evident from what has been said regarding the nature of the infection and the contagiousness of the disease. I may mention here, parenthetically, that a colleague, Dr. G. Woltereck, is attending at this time, three cases of pneumonia in one family, in which there is a strong presumptive evidence of a father and child contracting it from another child who was suffering from the disease. One may ask the question, "Would isolation have prevented the infection of the father and the second child?" It seems to me that isolation, in this case, would have protected the family; and, if it were justifiable in this instance, it certainly should be more generally adopted. The expectoration and nasal discharges should be as thoroughly disinfected as tuberculous sputum. There is little doubt in my mind that bad mouth-hygiene favors the development of pneumonia by paving the way for pneumococcus sinusitis, which, as pointed out, frequently antedates a true pneumococcus infection. Any inflammation of the nasal sinuses should therefore be promptly treated.

As sunshine and fresh air are inimical to the organism, living apartments should be both well lighted and well aired.

The ideal treatment for pneumonia would be a protective serum, but thus far, no very satisfactory results have been obtained. The same may be said of vaccines, leucocytic extracts, etc. Until some specific agent is discovered, we must content ourselves with the knowledge that three-fourths of all cases of pneumonia recover without treatment, and that too vigorous treatment may actually do harm. The general management should be much the same as that of typhoid. Frequent examinations of the chest in severe cases should be avoided as they tend to overtax the strength of the patient and may result seriously. Fortunately, the indications to be met by treatment are best disclosed by the general symptoms of the patient.

The diet should be light with plenty of fluids, such as water, albumin, milk, lemonade, strained cereals, eggs, etc.

Measures directed toward the arrest of the disease, are of doubtful value. Early bleeding has had its advocates but is now rarely resorted to. Tartar emetic formerly extensively used, has been practically abandoned. Veratrum viride finds favor in the hands of some eminent clinicians, and digitalis in large doses has recently been highly extolled.

SYMPTOMATIC TREATMENT.

Pain.—This symptom is best controlled by morphine; small doses if given hypodermatically usually relieve the pain. However, it should not be employed at or near the time of crisis. When the pain is not severe, Dover's powder may be administered instead of morphine. Locally, the ice-bag frequently affords great relief. Hot applications may be em-

ployed, but, as a rule, they are not as efficacious as the cold. Blistering should be avoided.

Delirium.—This symptom may be due to (a) toxemia, (b) fever, (c) inanition or impaired circulation, and (d) meningitis. The treatment naturally depends upon the cause of the delirium. If due to toxemia, tepid baths and ice-caps should be employed. If due to high fever, use cold baths and ice-caps. The delirium, associated with inanition due to deficient circulation, is frequently relieved by stimulants, such as strychnine, alcohol and camphor. Delirium due to complicating meningitis is practically hopeless, although temporary relief may be obtained by lumbar puncture. Hydrochlorate of quinine in doses of 5 to 10 grains is recommended for mild forms of delirium.

Sleep.—It is essential that patients suffering with pneumonia, get sufficient sleep, for lack of it will aggravate any circulatory or nervous disturbances of the patient. The most valuable drugs to meet this indication are trional, veronal and morphine.

Fever.—Ordinarily no treatment for fever is necessary. In hyperpyrexia, especially with delirium, quinine hydrochlorate in $7\frac{1}{2}$ gm. doses may be administered as recommended by Aufrecht. Phenacetin, antipyrin and pyramidon when combined with caffeine may be of service. The most satisfactory treatment for fever is the application of cold in the way of bath, cold packs or ice compresses to the chest. Hydrotherapeutic measures are of more value in controlling the functions of the heart, nervous system, respiration and elimination than in reducing temperature. In toxemia a tepid bath is more efficacious than a cold bath.

CARDIOVASCULAR SYMPTOMS.

Vasomotor Paralysis.—Since this condition gives rise to the most serious symptom-complex in pneumonia, steps should be taken to prevent its occurrence. For this purpose, A. Fraenkel recommends digitalis, administering as much as 0.75 gm. a day for three or four days, although he does not give it in cases in which such large doses would be ordinarily contraindicated. Forcheimer recommends caffeine in doses of $1\frac{1}{4}$ to 5 grains every four hours. Baths and fresh air, by their counteracting influence on the toxemia, diminish the tendency to vasomotor paralysis. Sufficient sleep is a factor of equal importance in inhibiting this vasomotor phenomenon. If, in spite of this treatment, the symptom-complex develops, active treatment must be begun at once. Forcheimer recommends the following: "Adrenalin is employed for the purpose of contracting the blood-vessels of the splanchnic area, for which it has an elective affinity; hypodermoclysis or venous transfusion with large quantities of normal saline solution for the prevention of asystole, one or two ice-bags on the abdomen, which reduce the pulse probably by stimulation of a splanchnic reflex." Adrenalin, 1 c.c. of a 1/1,000 solution is recom-

mended for hypodermoclysis. This amount should be administered every two to four hours, according to the symptoms. After twenty-four to thirty-six hours, caffeine may be used instead. Esser has obtained very good results by the use of camphor in large doses, hypodermatically.

Cardiac Insufficiency.—The usual routine treatment may be employed for this condition. Preparations of digitalis, either by mouth or better by hypodermic injections are indicated. Camphor or caffeine, either independently or in conjunction with digitalis, are often of great value. It is in this condition that blood-letting offers the greatest relief in pneumonia.

214 E. Preston Street.

THE USE AND ABUSE OF TUBERCULIN.

By WILLIAM C. VOORSANGER, M. D., of San Francisco.

Without doubt tuberculin has come to stay, and will become firmly established as a valuable adjuvant to our therapeutic armamentarium for conquering the dread disease, pulmonary tuberculosis.

It must also be apparant from a close study of tuberculin literature of the last five years that its use as a therapeutic agent is steadily on the increase in all countries. According to Bandelier and Roepke, its use in the German sanatoria has doubled between the years 1905-1908, and since that time is steadily on the increase. American literature, especially the reports from our large sanatoria and clinics, is replete with case reports successful and otherwise, of the use of the various tuberculins.

But if the above facts are apparent, it is doubly apparent to the physician in any large city, whose special work is the treatment of pulmonary tuberculosis, that many abuses are being practised by brother practitioners, not wilfully, but through ignorance of the properties of the remedy they are using, the dosage and the conditions under which it should be given.

We are working to-day in the third epoch of tuberculin as an immunizing agent. The first was Koch's discovery of this prepartion in 1890 and its world-wide use for a short period thereafter with complete failure due to the administration of excessive doses of a misunderstood toxin. Epoch two represents the period of many years when tuberculin was generally discarded by the profession at large, but faithfully and carefully experimented with by such men as Koch in Germany and Trudeau in this country, until they could present to us through the discoverer a new tuberculin and a new and better method of administration, with better theories for its action, with better results, and with no direct fatalities. Now comes epoch three, marking once more the world-wide use of this remedy, which, as it improves, may yet become a true specific. The question for the profession at this time to answer is, Are we going to have epoch four, in which we shall see this valuable remedy discredited through blundering misuse?

It has always seemed strange to me that physicians will begin a course of tuberculin treatment with no other knowledge of the agent they are using than that contained in the circular of information wrapped around the serial dilution prepared by one or another firm. The same physician would not open an abdomen singlehanded, or set a fractured limb upon the written directions of a surgeon. And still I firmly believe that to perform

the former ignorantly, is as gross an injustice to his patient as to perform the latter, without a knowledge of surgical procedure. The common procedure to-day with the great majority of physicians is to purchase a set of serial dilutions, enough to last from six months to a year, and begin administration with two drops of No. 1 dilution and increase as directed until dilution No. 2 is reached, and so on. I do not doubt for one moment that the firms manufacturing tuberculin have figured these doses scientifically and correctly, and that each new dose represents approximately an increase of 1/10 c.cm., and that the tenth dose means 1 c.cm. of dilution No. 1, which may be 0.001 mgrm. or 0.0001 mgrm., depending upon the preparation used. But this means working blindly upon the word of a printed circular.

Does the physician who uses this method receive any instruction as to the kind of case upon which to employ tuberculin? Does he know what a reaction means? Does he know how to avoid reactions? Does he realize that he is giving his patient a poison, a toxin, and not an anti-toxin? My own experience teaches me that none of these questions are answered for him, and that he mostly gropes blindly in the dark, injecting dose after dose of a preparation which is a two-edged weapon with great capacity for good or evil, depending into whose hands it is placed. Too often I have been asked to see an "incipient" case of tuberculosis which has received one or two months' treatment with tuberculin, increased serially according to printed instructions, and find a fairly advanced case, with high evening temperature, dyspnea, and loss of weight, where the proper treatment would be a long course of rest in bed and no tuberculin. I firmly believe that the real reason why more damage is not done is because in many cases the higher dilutions have lost their strength before they are administered and the physician, after the first two months, is injecting an inert solution. It seems reasonable to assert that no one can guarantee a dilution of tuberculin which is over three months old, and still physicians constantly procure a set of dilutions which, if administered properly, would take fully six months before the last strength is reached. It is perhaps most fortunate that when the high dilution is reached, it is inert and can do no harm.

Such a condition of affairs as above depicted must eventually discredit the use of tuberculin, either because damage may be done through administering it to a wrongly selected case, or in increasing the dose against the proper indication to go slowly, or, what is still worse, through obtaining no result by the injection of an inert solution. The practice of procuring enough tuberculin in dilution to last through an entire course of treatment cannot be too strongly condemned. If no good laboratory is at hand where dilutions can be made up properly and fresh and in quantity not exceeding ten injections—in other words, one series—then the physician must purchase the pure tuberculin and make up his own dilutions or have a competent laboratory worker make them for him.

What is also often forgotten is that we inject a toxin when we give tuberculin, and that it is not an antitoxin, that it should not be dubbed "serum treatment," having absolutely no vestige of serum in it. Tuberculin in any form is a product of the tubercle bacillus, either in whole or in part.

A physician should have this fact thoroughly ingrained before undertaking to give a course of tuberculin therapy. He should not take the directions of the firm selling tuberculin unqualifiedly, but he should draw his own deductions after mastering certain theories upon which the action of tuberculin and its reactions are based. I do not care within the scope of this paper to analyze in detail these theories. Whether we believe in the Arloing and Courmont agglutinin theory, the Bordét and Gengou antibody theory, or the most recent antituberculin hypothesis of Wassermann and Bruck, we should know one important fact:—that in administering tuberculin, a toxin, into the human system, we wish to obtain an overproduction of antibodies. Our aim, as I have pointed out in a previous publication, is to rouse to action the natural defenses already in the body, to stimulate them, and to gain as great a production of them as possible. I am quite in accord with Roemer and Joseph who state that it is a matter of great indifference whether we call tuberculin a toxin, an endotoxin or a toxo-endotoxin; also whether we differentiate the various above-named theories to explain tuberculin immunity. Only the biological chemist is equipped properly for a thorough understanding of many of these complex theories, but any physician should understand the constituents of the poison he is giving, the general theory of its action, and what he is trying to accomplish.

I personally believe in tuberculin. My own studies and experiences have made me come to the conclusion that, within limits, it aids and quickens the arrest or cure of a tuberculous patient. What a pity that Koch did not anticipate Ehrlich's example and patent his product, Tuberin, just as the latter has patented "606!" Thus would we have avoided a most confusing state of affairs, wherein we see over eighty different kinds of tuberculin placed upon the market. Is it at all surprising that the average physician who has had neither time nor inclination to become expertly versed in this subject, should become very much puzzled in attempting to select a tuberculin, and should finally follow the lines of least resistance and take the one proposed by an enterprising and intelligent biological salesman? I grant that, with so many tuberculins in existence, each with its champion or set of champions, it becomes a difficult matter to choose the kind of tuberculin one wishes to use. It is indeed of not very great importance, so long as we are consistent in the use of the particular form used, be it T. R., B. E., B. F., or the most recent Spengler's I. K. (Immun-Koerper, or body). I personally have always used T. R., because since every tuberculin is a product of the tubercle bacillus, it seems rational that that tuberculin containing

the entire bacillus should be the one to use. Besides many investigators the world over give favorable results after using T. R. during the length of time, and the only objection ever voiced against it was its great toxicity and its capability of producing reactions, a condition easily overcome if we start with low enough doses and carefully regulate the increase. I use bovine tuberculin because, following the example of Nathan Raw, who published his brilliant results in the *Lancet* of February 15th, 1908, I was able to get a very good percentage of success in 28 cases (See *Cal. State Med. Journal*, Oct., 1910), which at this date has doubled, and as I continue its use, my results continue satisfactory. In my own mind I feel certain that bovine T. R. is the logical tuberculin with which to treat a case of tuberculosis due to the bacillus *typus humanus* (pulmonary form), and that Human T. R. is the proper tuberculin to administer for tuberculosis of the *typus bovinus* (surgical and glandular form).

The use of bovine tuberculin has brought me to the belief that its greater curative power lies in its possible ability to produce a greater number of antibodies. Still the whole subject of tuberculin therapy is so empirical that each investigator must choose his own form of tuberculin and watch his own results. No one can deny that we are still experimenting, that we are not dealing with a specific, and that we do not accomplish an immunity to tuberculosis, but an immunity to tuberculin. How important then to approach the use of tuberculin with extreme caution, with even fear, until such time as one feels he is competent to appreciate the minutest reactions and negative phases which may occur during a course of tuberculine treatment!

First and most essential in beginning the use of tuberculin is your own belief in its efficacy. In a recent article, Bandelier of Gorbersdorf, under the heading of "Tuberculinskepsis," says: "Whoever enters upon the use of a remedy with mistrust is not in position to segregate the good from the bad and draw proper conclusions." In other words, start your course of tuberculin therapy which must extend over a period of from six months to a year, with a mind open to impressions, not with a mind made up for failure. Otherwise you will not have the proper perspective, nor see small blunders of technique, nor observe gradations of reactions, such as slight malaise, headaches, nausea, local reactions, etc., nor be able to patiently await a sometimes rather deferred improvement, and attribute failure to the method when indeed your own state of mind did not allow you to give it a fair chance or to observe it properly. Be open to conviction and do not scoff. For the tuberculin scoffers we have just this word,—quoting Goethe: "People scoff at things they don't understand." To discard a method after a trial is fair; to damn it without a trial shows absolute ignorance.

Certain tenets can be drawn up for the physician who believes in tuberculin therapy. A tuberculin trilogy which should be memorized by him is the following:—

1. Choose your case well.
2. Begin with small dosage.
3. Regulate exercise and rest carefully.

Let us briefly analyze this trilogy. Careful selection of a case requires sound judgment on the part of the physician. After all, what class of case is best adapted to tuberculin therapy? The fact that many incipient cases get well without tuberculin is no argument against its use. Beginning cases in good state of nourishment and without fever yield the best results with tuberculin; and in such cases, we can more quickly and safely get a tuberculin immunization. We cannot too often quote Trudeau who shows that 18 per cent. more of incipient cases treated with tuberculin are living than of those untreated. With improved technic and better understanding of tuberculin these figures will certainly be improved upon.

The burning question always before us is: Do we properly diagnose incipency? Many abuses would cease if physicians would more carefully diagnose these cases. First we should be most careful in pronouncing a patient incipiently tuberculous where no tuberculosis exists. We must not diagnose merely upon gradations of breathing, or dulness, because very often a high pitched note or a roughened inspiration over one or other apex, especially right, does not prove tuberculosis. But gradations of respiration and duiness, especially increased bronchophony over an apex, a physical sign which unfortunately many to-day are putting into oblivion, together with a careful history of the case, examination of sputum, blood, urine and tuberculin tests, all combined and properly considered, should act as aids to a diagnosis of incipient tuberculosis. The worst blunders, however, are made in diagnosing incipency where tuberculosis is present in moderately advanced form. In these cases error would often be avoided if x -ray examination were resorted to. If the x -ray has done anything at all in the past five years in the diagnosis of pulmonary tuberculosis, it has shown this: that many persons with supposed incipient tuberculosis of one or both apices have fairly well advanced or disseminated tuberculosis. A safe rule to follow for any but one expert in the use of tuberculin is, not to use it in cases running temperature. Such cases should be put to bed, and after thorough rest has caused a reduction of temperature, tuberculin may be slowly commenced. I have in a few stubborn fever cases seen improvement under minute doses of tuberculin, but this procedure should only be attempted when other means of reducing temperature have failed and when conditions demand quick action. Needless to state, a patient with hemoptysis should not receive tuberculin until all trace of bleeding has passed.

Should we give tuberculin to advanced cases? Again opinion is divided. Personally, I believe that only in a few well-selected cases

should tuberculin be administered where the tuberculosis is far advanced. Not that any harm can ensue, but that in most instances no result can be obtained. In advanced tuberculosis, the organism is most often in a passive state where it will not respond to any stimulus. The best one can hope for is a slight improvement, a slight prolongation of life. Therefore, it is better not to use tuberculin in such cases, unless it is made absolutely clear to all parties concerned that failure is to be expected and that success in these cases is uncommon.

One of the principal abuses in the administration of tuberculin lies in the dosage. We cannot begin with too small a dose. Many a physician becomes discouraged at the outset of a course of tuberculin treatments because he gets a rather severe reaction. This is often due to too large a beginning dose. Give a minute beginning dose and increase gradually,—the smaller the better. Personally, I begin with Bovine T. R., 0.00001 mgrm., increasing 0.1 c.cm., until ten doses are administered, giving three injections weekly. When ten doses have been given of this dilution, the strength is increased ten times and the same process repeated. When I am giving 0.01 mgrm., I increase my interval to twice weekly, later to once weekly, and later to bi-weekly. A course of tuberculin treatment should take at least six months to one year. If all goes smoothly, six months may suffice; if reactions occur, which should happen but very seldom if the case is carefully selected and the dosage increased slowly, more time is required. What should be our maximum dose? This is a matter of individual judgment, depending upon whether one aims to attain a state of tuberculin tolerance or tuberculin immunity. I believe that the former is all we should strive for, *i. e.*, to bring the patient's tolerance to that dose upon which he shows steady improvement and retain him on it for a long period of time. What the dose should be, depends upon the clinical and physical improvement of the patient. I seldom find it necessary to go beyond 1.0 mgrm. of Bovine T. R., and have often stopped at 0.1 mgrm. One should be thoroughly impressed with this fact: that no matter what tuberculin is used, the regulation of dosage is highly empirical and its increase and maximum dose dependent upon the physician's experience, judgment and ability to properly construe signs of improvement or retrogression in his patient.

Exercise and rest should be most assiduously regulated, and the patient thoroughly impressed with the danger of autoinoculation from overstrain. I firmly believe that tuberculin reactions often occur from not instructing the patient to take a great amount of rest daily, particularly after an injection. A plan I attempt to carry out, but which is not always feasible, is to have my patients, even though not suffering from any particular symptoms, remain in bed during the first two months of a course of tuberculin injections. This enforced rest increases general resistance and facilitates the desired tolerance for tuberculin. When the patient must be ambulant, his daily amount of exercise and rest should

be absolutely prescribed as well as his food, medicine and tuberculin. If this rule were followed, many a reaction would be avoided, many a patient would improve, many a life would be saved.

The last word upon tuberculin has not yet been spoken. It is still in a state of high empiricism, and he who uses it must approach his task with caution, with an understanding of the theories of immunity, with a knowledge of the fundamental truth governing the use of so potent a toxin, with a sound training in diagnosis, with trained experience and judgment, and above all, with a due consideration for the welfare of his patient. We are striving for a result. We want to stamp out civilization's greatest present day scourge. It matters little how this desideratum is obtained, whether through climate, hygiene, food, air and rest, without tuberculin or with it. Up to the present it has not been accomplished without tuberculin; therefore we must add the latter to our armamentarium. But tuberculin will not cure alone; if it did, it would be the true specific for which humanity is so loudly clamoring. Its use includes proper surroundings, housing and food. No remedy can be of avail with a poor *milieu*, without alterations of bad living and without special care. I am on the side of those who believe that tuberculin, properly used, has aided and hastened many a cure; that in many instances it has effected improvements, arrests or cures which would not have been attained without it. It must be placed in the hands of the general practitioner for tuberculosis in a general disease; but his hands must be trained,—he must learn its use and avoid its abuse. Only in this way will it ever be proven whether tuberculin is to become the boon to mankind which Koch so nobly in his lifetime strove to make it.

162 Post Street.

REPORT AND ANALYSIS OF A GOITRE WITH MARKED
INTRATHORACIC EXTENSION.

By NORVELLE WALLACE SHARPE, M. D., of St. Louis.

Among goitres of various sizes, configurations and mass topography, large intrathoracic growths easily rank among the rarest and most interesting. Consideration of such tumors has definite value to the anatomist, pathologist, clinician and surgeon.

The literature is not rich in reports of such cases, and a tabulation of the results of an exhaustive search would seem to be profitless, for the details of recorded cases are noteworthy neither from the standpoint of amplitude nor exactitude. A sufficiently fair conception of the more recent English and German thought, for the purpose of this report, is probably to be found in Bland-Sutton's "Tumours Innocent and Malignant," 1907; and in Ewald's "Schilddruese, Myxodem und Kretinismus," 1909. Bland-Sutton (q. v.) discusses the two forms of adenoma found in the thyroid, and the complications that are encountered. Reverdin (*Goitre Kystique Uniloculaire Enorme, Extirpation totale. Guérison. Revue Med. de la Suisse romande*, Vol. XIII., 185, 1883), records a case, man, aged sixty-two, cystic adenoma of thyroid, 60 cm. in circumference, punctured. Bruns (*Cysten kropf von ungewöhnlicher Grösse geheilt durch Extirpation, Beitrage zur klin. chir.*, Vol. VII., p. 650, 1891), removed a cystic goitre from a woman, aged fifty-eight, which had extended so low as the umbilicus, and which, from its weight, had produced a cervical lordosis and a thoracic kyphosis. So heavy was it that she was accustomed to rest it upon a table, when seated. It was successfully enucleated. Sutton states that if the goitre reaches so low as the thoracic inlet, it becomes squeezed between the manubrium of the sternum and the trachea. This impaction induces urgent symptoms of dyspnea. He alludes to a man of thirty-six, found lying in the street near Middlesex Hospital, apparently in a fit. When brought to the casualty room, he was found to be dead. At autopsy a tumor connected with the cervical section of the trachea was found. This proved to be an enlarged accessory thyroid gland, embedded in a thick fibrous capsule, whose inner segment was firmly fixed to the trachea,—between the fourth and ninth semi-rings. The tumor was somewhat larger than a dove's egg, but had severely compressed the trachea. Ewald (q. v.), after discussing sundry developmental details of goitres, suggests that if they extend in the direction of *incisura sterni* and penetrate behind the sternum, the so-called "sub-sternal goitre" is formed, which with deep inspiration may descend into

the anterior mediastinum and disappear entirely, or nearly so; and with expiration may reappear at the level of the hyoid. This has been observed, long since, by Fodéré, and called by him, *goitre en dedans*, or *goitre plongeant*. The goitre, however, may become separated or bound down within the depths of the mediastinum; it then usually lies behind the sterno-clavicular junction and first rib, and may occasion the severest signs of compression, and considerable diagnostic difficulties, especially if the sac juts still more deeply into the mediastinum, into the supra-clavicular space, or even into the pleural cavity. Thus Virchow reports that a multilocular cystic tumor, larger than a fist, was brought to him as having been found in the pleural sac of a patient. Diagnosis was not made until microscopic examination of wall of cyst revealed that in it were enclosed multitudes of compressed thyroid follicles. Adelman has noted the left lobe elongated in front of the vessels and nerves, and extending behind the clavicle and first rib into the thoracic cavity, where it pushed back the left lung to a considerable degree,—from there reaching over to the arch of the aorta. Woelfler states that that form of goitre, which on account of an abnormal mobility of the larynx and trachea, will be found at times retrosternal, at other times will rise to its usual site. Thus that excursion, which in the case of *goitre plongeant* occurs rhythmically (with respiration), is displayed in the case of a floating goitre only at certain times and is quite independent of respiratory movements. The descent of the goitre and its mobility is also, in part, made possible by the fact that the goitre occasionally is suspended from a pedicle. This is derived from the original point of thyroid attachment, forms a connective tissue cord, and is provided with vessels and nerves. Such cords, probably caused by the pull of the tumor, are commonly encountered with large goitres; though Woelfler has noted them among the small fibrous group.

The case hereinafter detailed is placed on record on account of both rarity and interest. Owing to its immobility it obviously will not fall under the sometime classification of Fodéré, *goitre plongeant*; nor does it conform to the description of Woelfler, as noted above. This bilobed goitre, without isthmus, whose lobes were conjoined merely by velamentous connective tissue, was markedly asymmetrical; thus differing, radically, from the dogmatic, but wholly groundless, postulate, of Bland-Sutton:—"When both lobes contain an adenoma, the gland will maintain its normal shape; when one lobe only is involved, the gland becomes unsymmetrical." The case detailed by Adelman, most nearly parallels the one which forms the subject of this report. Prof. R. L. Thompson (Pathologist to the Medical Department, St. Louis University), assures me that, structurally, the mass conforms to the conventional adenomatous type as observed in the thyroid. No cysts were noted; nor were the parathyroids discovered. Report is as follows:—

In the routine dissection work of the Anatomical Department, St.

Louis University, Session, 1909-1910, certain interesting, but minor peculiarities were discovered in the neck of a male cadaver. The cause was found, when the deeper structures were invaded, to consist in a moderately large, bilobed, centrally implanted, goitre. At this stage of the dissection but mild interest had been stimulated, owing to the fact that neither in size, location, nor configuration did the goitre present anything of special note; though both lobes, in particular the left, extended well below the sterno-clavicular arch. In order not unduly to

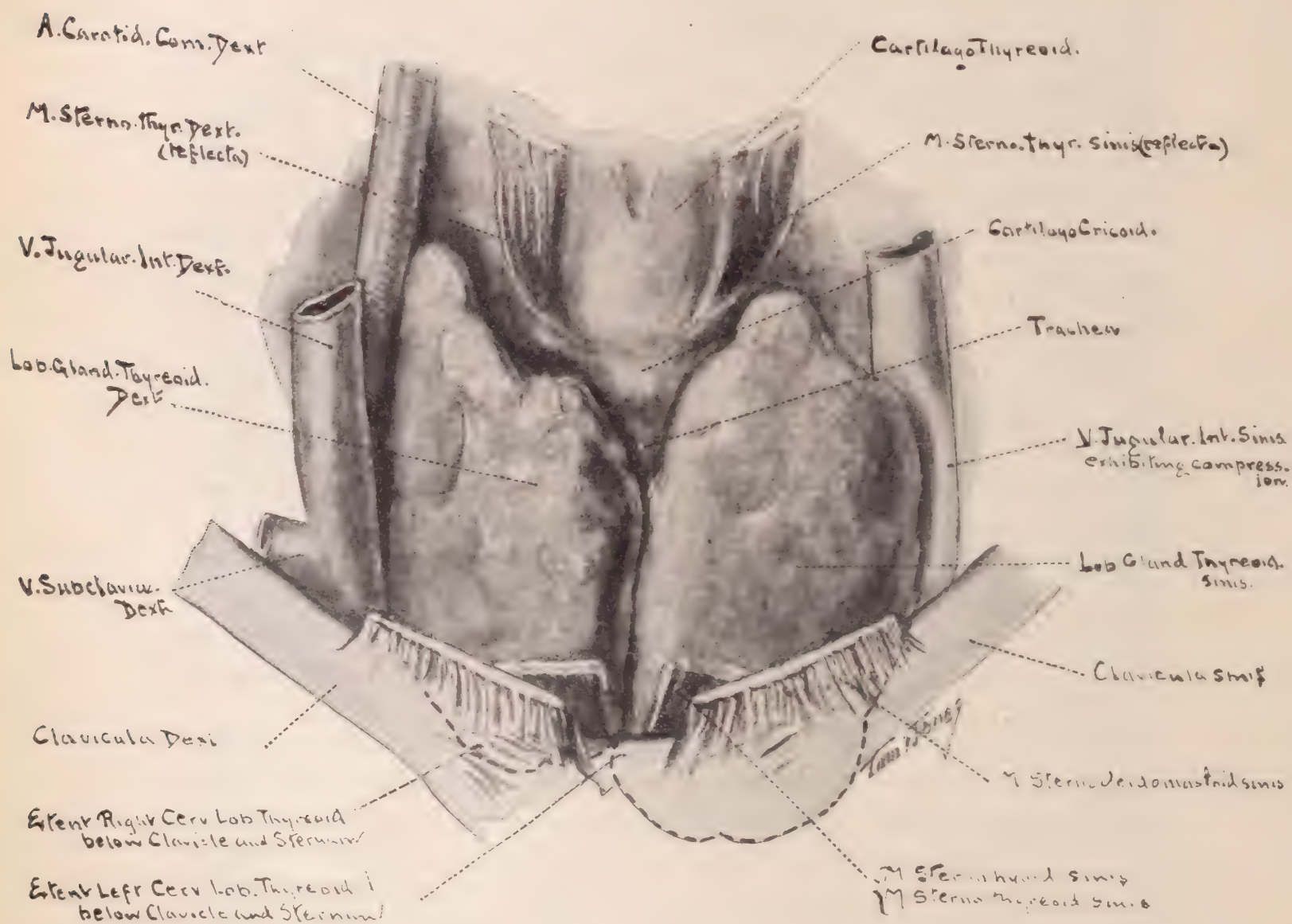


Plate I. Showing cervical portion of lobes of Thyroid, and their extent beneath Clavicles and Sternum.

Note absence of isthmus;—with definite dissociation of Lobes. (4/9 life size.)

disturb structural relations, further orientation was suspended. Later, as dissection proceeded, the above-noted facts were confirmed; the left lobe terminated where palpation had outlined it, but the right lobe, which had been thought to be the smaller, yet to conform fairly in both size and contour to the left lobe (conf. Plate I., broken line periphery), was now found to be in apposition (or in continuation) to a solid centrad mass. It was thought, by some of my colleagues, that this was the superior vena

cava, well loaded with blood; nor was it to be denied that their opinion was based on highly suggestive evidence. But further study and exploration confirmed the belief that the inferior periphery of right lobe (shown by broken line in Plate I.), did not mark the actual extent of the growth, but that extending centrad, dorsad and dextrad, and beautifully conforming to its osseous environment, it terminated at the root of the right lung.

Plate I. (cervical portion of goitre), Plate II. (right lateral view of goitre), and Plate III. (gutters left, after complete removal of goitre), quite felicitously display the structural relations encountered at different stages of the dissection.

As suggested, such a mass presents interesting material for anatomist, pathologist, clinician and surgeon. The subjoined data will, in general, conform to this sequence.

TABLE I.

A brief detail of the more important structures, and the more significant distortions which were observed. (See Footnotes 1 and 2, page 319.)

1. Gl. Thyroid. I., II.	Ordinarily should not extend below Vert. I. Thoracic;— is found to extend on right side so low as Vert. V. Thoracic, and bifurcation of Trachea. Posteriorly it rests upon the vertebræ and angles of ribs.	
2. Trachea. I., III.	Bifurcates at level Vert. V. Thoracic. Throughout its course it shows an average deviation to the left of 1 cm. From Vert. VII. Cervic to Vert. III. Thoracic it is markedly compressed; an excellent example of <i>Saebelscheide</i> , of the Germans.	
3. Gutters. III.	Left after removal of Goitre, are sufficiently oriented in Plate III.	
4. Aorta. III.	Both cephalad border and right laterad face normal.	
5. Fasc. Pretracheal.	DEXT.	SINIS.
	Ventrad to tumor.	Dorsad to tumor.
6. Pulmon. II., III.	Root, Normal. Vert V. Thoracic. Apex. depressed to neck Costa. I.	Root. Normal. Vert. V. Thoracic. Apex. Normal.
7. A. Anonyma. II., III.	At its origin from aorta should be found in right hemisection, Crosses the Trachea at level	but has been displaced 1 cm. to left of midline. of upper border of sternum.
8. A. Subclavia Dext. II.	Practically normal.	
9. A. Subclavia Sinis. III.		Moderate dorsad bowing.
10. A. Carotid Com. Dext. I., II., III.	At normal level of Gl. Thyreoid lies dorsolaterad to Goitre; but lower, (the Goitre hugging the vertebræ) it tends ventrad and crosses it at level of superior margin Costa I.	
11. A. Carotid. Com. Sinis. III.		exhibits marked dorso-laterad displacement, quite concealed by left section of tumor. Conf. 1.)

		DEXT.	SINIS.
12.	V. Jugular Int. Dext. I., II., III.	Normal throughout; save that it exhibits displacement resulting from laterad thrust of tumor. Junction with V. Subclavia Dext. normal, but shows similar displacement. In lower portion of its course it accompanies A. Carotid Com. Dext. (q. v.) in its ventrad bridging of tumor.	
13.	V. Jugular. Int. Sinis, I. III.		Exhibits marked dorso-displacement as A. Carotid. Com. Sinis. (q. v.) Only partially concealed by tumor.
14.	V. Subclavia Dext. I., II.	Practically normal.	
15.	V. Subclavia Sinis.		Exhibits dorsad bowing similar to A. Subclavia. Sinis. (q. v.)
16.	V. Anonyma Dext. II.	Laterad to right edge of Sternum; moderate caudad displacement.	
17.	V. Anonyma Sinis. II., III.	Junction of V. Anonymæ occurs	Moderate caudad displacement. in right first interspace.
18.	V. Cava. Sup. II. III.	Conf. V. Anonymæ, 16 and 17.	
19.	V. Azygos. Major. II.	Caudad displacement of arch.	
20.	N. Phrenic. Dext. II.	Lies laterad to N. Vagus. Dext.; crosses ventrad face of tumor.	
21.	N. Phrenic. Sinis.		Normal, save pushed laterad by tumor.
22.	N. Laryng. Inf. Dext. II.	Held within G1. Thyreoid capsule. Given off from N. Vagus Dext. at approximately, the junction of middle and lower thirds of tumor. Tumor has caught in its loop and driven it caudad, under strong tension, fully 8 cm. below normal. Curving around caudad face, it ascends on dorsad face, for customary distribution.	
23.	N. Laryng. Inf. Sinis.		Moderate dorsad displacement; otherwise normal.
24.	N. Vagus Dext. II.	Courses over ventrad face of tumor:—outside of capsule:—displaced laterad; —under strong tension.	
25.	N. Vagus. Sinis.		Normal save exhibiting moderate dorsad displacement.

Footnote 2 (q. v.) directs attention to the interesting gutter which exists in the right lobe of the goitre. This gutter was filled with vessels and nerves, as portrayed in Plate II., and bounded ventrad by the proximal segment of the right clavicle, sternal segment of the first rib and its chondral extension, and the right lateral segment of the manubrium. Though this condition,—the guttering of solid masses by soft structures,—is quite common elsewhere (the well-known ability of the rectum to maintain a fairly satisfactory canal when encroached upon by a uterine fibromyoma that drives it against the sacrum will serve as an instance), yet the belief is ventured that so exquisite a canal in a goitre, (without doubt elaborated by the vessels), will not frequently be noted. The dorsad face of this portion of the growth closely hugs the posterior wall of the inlet to the thorax, maintaining not only apposition with vertebra and rib, but preserving for a space (varying in width from 2 to 6 cm.) an almost exact parallel with the ventrad face. Within this gutter neither vessels nor nerves showed any macroscopic evidence of compression.

While to the trained anatomist or surgeon, Plates I. and II. will probably afford the greater interest;—for those whose appetite is rather for the bizarre, Plate III. is to be commended. Mr. Jones was requested to make this sketch for the specific purpose of giving, at one glance, the extent of territory occupied by the goitre, and the effect of its peripheral thrust upon contiguous structures. Allusion already has been made to the striking example of *saebelscheide*. Plate III. shows, in addition, very accurately, the effect of compression upon the left common carotid and left internal jugular. It was a fortunate fact (for this patient) that these structures were not held against a rigid background (as seen in the retroclavicular gutter of the right lobe). For not only their own elasticity but the mobility of the cervical musculature, acting in harmony, probably prevented a pressure stasis, that however interesting it might prove from a pathologist's viewpoint, would hardly be anticipated to have met with the patient's unqualified endorsement. With these facts at hand we are led to the conclusion that the carotid and jugular, during life, were able to functionate with reasonable adequacy. In this conclusion we are strengthened by the absence of any gross evidence of tubular dilatation resulting from pressure in continuity. That Plate III. is able

Footnote 1. Roman numerals, following the various sub-heads, designate the Plates in which the notation may be studied.

Footnote 2. The broken lines of Plate I. indicate the caudad termination of the left cervical lobe; on the right, however, the right cervical lobe does not actually terminate with the broken line, for with an abrupt recession it tends posteriorly to promptly re-expand into the right intrathoracic lobe. It must be understood that these are two arbitrarily designated lobes, for the *right lobe is one continuous mass*. The broken lines of Plate II. indicate the outline of the mass hidden by the intervening structures; include the junction between the arbitrarily designated cervical and intrathoracic lobes:—include also the remarkable gutter within which nest the bridging vessels and nerves.

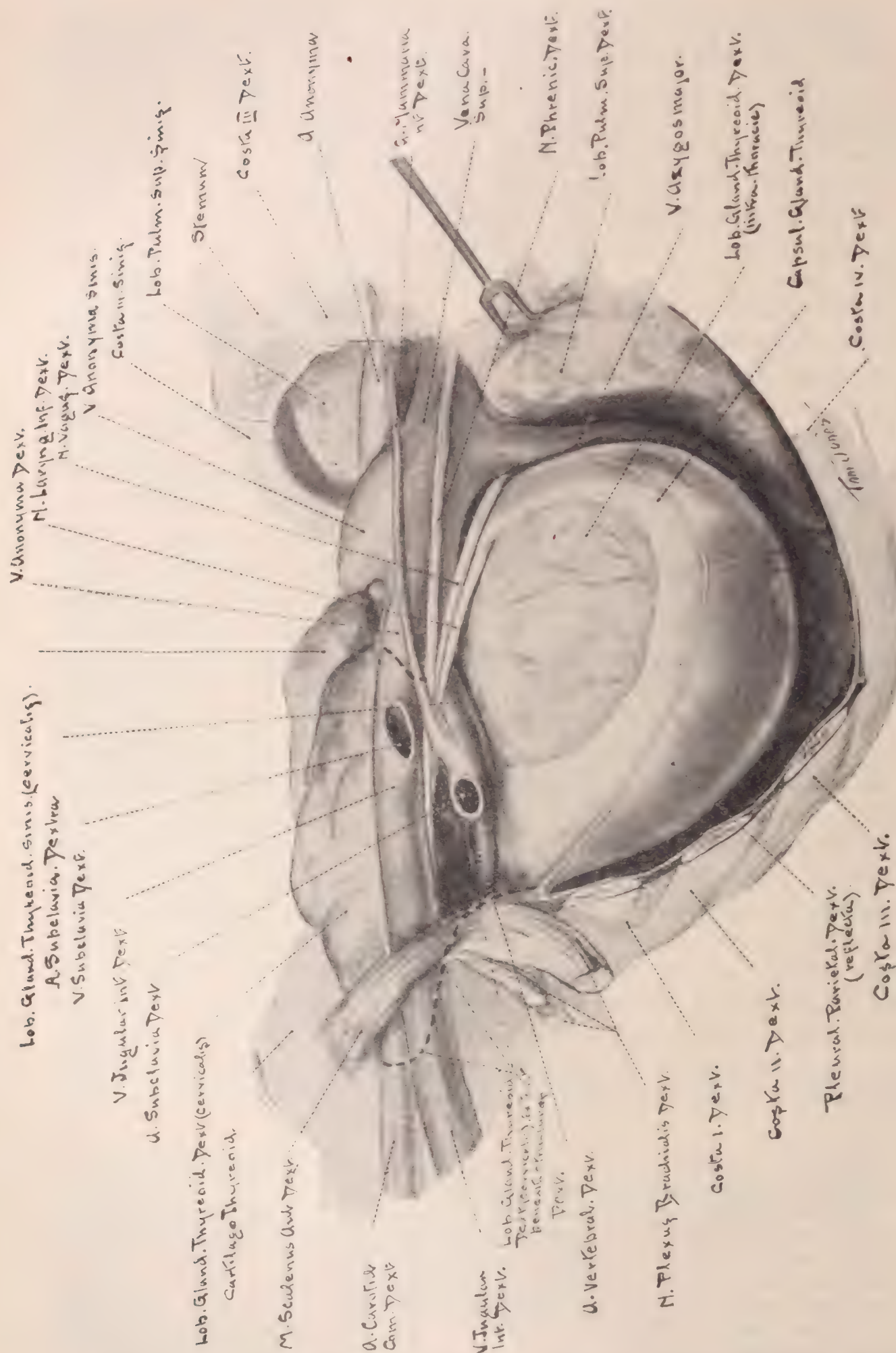


Plate II. Showing right lateral view of Thyroid. (Clavicles, upper Ribs, Manubrium and portion of Gladiolus removed.) Note position, course and tension of N. Laryng. Inf. and N. Vagus;—also depressed and compressed arch of V. Azygos Major. (4/9 life size.)

to portray pressure areas on carotid and jugular, is rather to be explained by the excellent system of preservation of material, in vogue in the Anatomical Department, which has caught and maintained these vessels

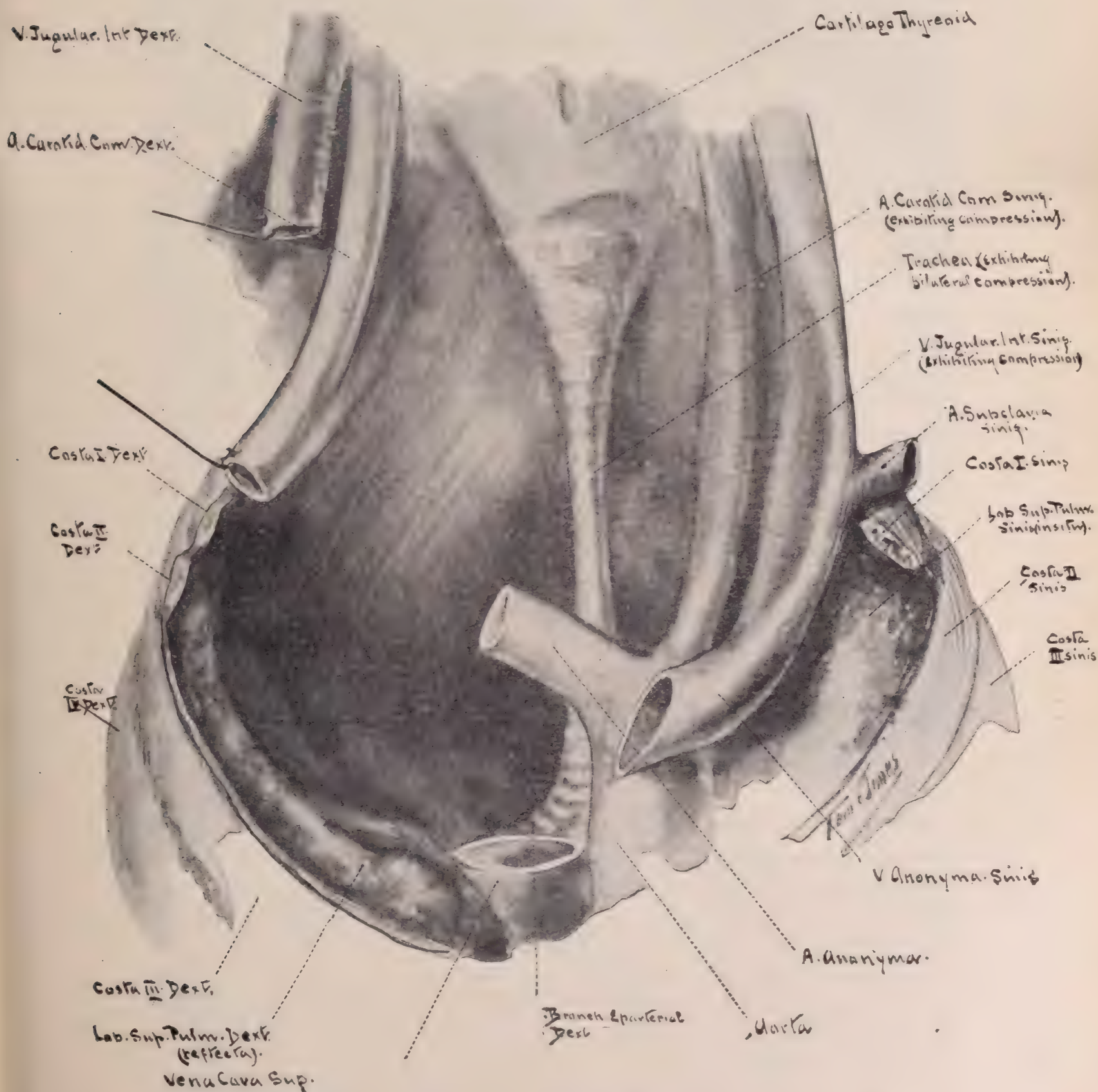


Plate III. Showing enormous gutters left after complete removal of Thyroid. Note left A. Carotid and V. Jugular deformation and malposition; also extreme type bilateral compression at Trachea; also position superior lobe of right Lung, showing effect of the combined caudal and ectad thrust of the right intrathoracic portion of Thyroid. (4/9 life size.)

in this abnormal pose:—the significance would, therefore, be post-mortem rather than ante-mortem.

Attention is directed to protocol 22 of Table I., which deals with the right recurrent laryngeal nerve. The record is there made that owing to the intrathoracic lobe having caught within the loop of the nerve and driven it caudad:—the nerve loop has been carried fully 8 cm. below its normal course. A study of Plate II., will show that this statement by no means affords a fair conception of the actual elongation of the nerve itself, for it merely measures how far the loop has been carried. *The actual elongation of the nerve was a trifle in excess of 25 cm.* Protocol 22 shows that the recurrent laryngeal was held *within* the capsule of the goitre, while protocol 24 shows that the right vagus courses *outside* of the capsule. Both nerves were under tension, but the tension of the recurrent laryngeal was greatly in excess of that of the vagus. It would seem to be highly probable that during the growth of the intrathoracic lobe, which doubtless maintained a fairly constant, possibly increasing, tension upon the nerve loop;—that the nerve gradually cut its way through the capsule, not ceasing until checked by the resistant tissues of the adenoma proper.

As the tumor differed in no essential from the conventional thyroid adenomata (so reported by Prof. Thompson), I am unable to submit any microscopic data of interest. The pathologist, alike with the clinician, will find attractive browsing in studying the changes wrought by mass pressure; in particular the evidence offered by the left common carotid, left internal jugular, the trachea, the right vagus, the right recurrent laryngeal and the azygos major. At this point it may be recorded that the blood supply of the growth was significant, neither from the viewpoint of number of vessels, nor size of vessels. In fact, it was rather to be noted that vessels were unexpectedly small, and numerically below what might have been anticipated. No isthmus was found (conf. legend under Plate I.).

The clinician would fain know what was the picture exhibited during life, and would speculate regarding the direct and more remote subjective and objective changes that would be found. His prime eagerness would probably center in the question of diagnosis. Unfortunately, I am able to tender but few details. Yet something may be laid before him. By rare good fortune, I have been able to trace this cadaver and to secure a copy, in detail, of this man's record, while a patient in the hospital. It would hardly seem necessary to give this record in full; the following extract must suffice:—

"Natra Kaukasa, native of Turkey, single, male, entered hospital Nov. 28th, 1909, died Dec. 12th, 1909. The provisional diagnosis under which he entered, was "general debility and bronchopneumonia." He was conscious, not seriously ill, and complained only of weakness. Stated that he was thirty-eight years old, but is probably twice that age. Does not

seem to understand questions very well. Under "physical examination": Percussion and palpation negative, auscultation revealed increased breath sounds and a few scattered indistinct râles. Heart rapid and irregular, no murmurs, arteries hardened. (Chart shows that pulse ranged from 88 to 136, respiration 22 to 40, latter just preceding exitus.) The ultimate diagnosis was 'gastric carcinoma (?) and pyelitis.'"

Only the more salient memoranda have been included in this abstract. The interesting fact is that not only was the goitre not found, but the most critical study of this record shows that it was not even suspected. It would be unfair to assume that the examinations to which this patient was subjected, were wholly incompetent and lacking in reasonable fidelity. Owing to the system followed at this hospital, it may be safely maintained that the patients receive a carefulness of medical supervision considerably in excess of the vast majority of patients in private practice. I am able to offer a bit of personal testimony:—In the dissection of this head and back, definite annoyance was occasioned the students by an inexplicable rigidity of the neck. Various suggestions were made,—one of which I happen to recall,—that the formol solution employed within the cranium, had, by some means, escaped, and penetrating the cervical muscles, had stiffened them. Retrospectively speaking, this rigidity may be wholly assigned to the tumor masses firmly blocking the thoracic inlet. In spite of the fact that I was endeavoring to solve the problem of the aforesaid rigidity, and in spite of the additional fact that I was in a receptive mood for the discovery of conditions of surgical and anatomical interest, the existence of the goitre was wholly unsuspected by myself. I make this confession, with no inconsiderable regret, but I venture to offer the following, partly in extenuation. The cervical topography was, for all practical purposes, the topography of a normal neck. I am unwilling to state that cervical and supraclavicular mensuration were absolutely normal or absolutely symmetrical; but I positively affirm that notwithstanding the large growth that was present, so insignificant were the surface changes that the faintest suspicion of the actual condition was not occasioned.

While, on the other hand, it is almost incredible that *in vivo* such a mass with such definite anatomical distortions could escape the scrutiny of a master in diagnosis; that he would fail to suspect the tracheal compression; fail to find evidence sequent to the vagus, and especially the recurrent laryngeal tension; fail to discover the presence of the mass itself; yet the evidence is at hand that this goitre slipped through the diagnostic net of the staff of the aforesaid hospital. This fact is emphasized, and the comparison drawn, not to censure the staff, but to direct thoughtful consideration to the far more important fact that this great tumor actually did escape detection.*

*In this connection, the following extracts, taken verbatim from a recent paper entitled, "Cretinism, Juvenile and Adult Myxoedema;—Exophthalmic and Simple Goitre.—The importance of Making an Early Dif-

The question that confronts the surgeon is essentially a practical one. What surgical attack may be employed for removal of such a tumor? Or if removal be considered impossible: what alleviative measures may be instituted?

After study of this material the conclusion has been reached that relief could be attained with a fair measure of certainty; and that complete removal is, technically, not impossible.

For anatomical reasons, the hypothetic attack is divided into three steps:—

- I. Isolation and removal of left cervical lobe.
- II. Isolation and removal of right cervical lobe.
- III. Removal of right intrathoracic lobe.

It is obvious that Step I. would be comparatively simple. The gain that would accrue (even though nothing else was attempted), would be relief of pressure on the left common carotid and internal jugular; but more particularly, the lifting of at least 50 per cent. of the pressure on the trachea.

Step II. would prove but slightly more difficult than Step I. (provided no effort was made to accomplish Step III.). The pedicle which would be left would consist of the retroclavicular portion of the growth. Careful study of the structures lends confirmation to the belief that bleeding could be controlled, and the so-called "pedicle" competently covered in with its own capsule. Even if no more was accomplished than Steps I. and II., we would attain almost complete relief of pressure in all supraclavicular and suprasternal structures. This, of itself, would be such an excellent accomplishment that one might well be justified if he refused to attempt the final stage.

Step III. is conceded to be difficult, but the claim is made (based largely on dissection), that it is not impossible. While it is admitted that from

ferential Diagnosis.—Of Equal Interest to the Physician and Surgeon and Other Specialists.—Treatment," which seems to have been read before both an Academy of Medicine and a Medical Society; and published in one of our reputable medical journals and reprinted in another,—should prove not wholly devoid of interest.

"There is no difficulty in diagnosing the grosser and typical forms of any of them; so I will not especially dwell on them. It is very important, indeed, to the victims of these diseases that they be recognized early," etc., etc.

"The differential diagnosis in the diseases of the thyroid from each other and from other diseases which they may resemble, is not difficult in 'good illustrated' and typical cases. The milder forms are more difficult to diagnose," etc., etc. (Italics by the author.)

Unless we are willing to admit that these statements are merely a tintinnulating collocation of words, in harmony with much of the glittering generalizations that are gravely presented before many of our Societies and recorded in our Journals;—we are forced to believe that, in the mind of the author, the question of differential diagnosis, in these somewhat allied conditions, is felicitously easy. Nor are we able to gainsay the lurking suspicion that this amusingly dogmatic pronouncement is not far removed from the actual *credo* of the faculty at large. And yet such cases as the one herewith recorded, may well serve to remind us that the diagnostic path is by no means invariably rose-strewn.

the standpoint of mere technical brilliancy, it would be a genuine surgical triumph to remove the right intrathoracic lobe *en masse*: yet true conservatism would direct that fragmentary excochleation be given the preference. The technique would be somewhat as follows:—Sever the claviculo-sternal junction; draw clavicle outward; release the first and second ribs (if additional room be found imperative cut clavicle and ribs, from within out, by means of a Gigli saw, leaving an external periosteal attachment, and thus developing an hinged flap); the bridging vessels and nerves should be retracted upward and inward; and the mass, controlled by tenacula and traction sutures through the substantial capsule, should be removed piecemeal.

There are three important factors that would make possible this technique:—

1. The scanty blood supply.
2. The blood vessels and nerves have been stretched and otherwise rendered plastic by the long-continued thrust of the tumor; and thus are far less resistant to manipulation than normal structures in conventional relations.
3. Owing to the intrathoracic lobe having pushed down the parietal pleura before it, Step III. should be accomplished extra-pleurally.*

*I desire to acknowledge my indebtedness to Prof. Albert C. Eycleshymer for his courteous permission to employ this material as the basis of this analysis; and to express my appreciation of the valuable coöperation of Assistant Prof. Daniel M. Schoemaker in checking my findings.

SALVARSAN IN THREE REBELLIOUS CASES OF SYPHILIS.

By ESTILL D. HOLLAND, M. D., of Hot Springs, Arkansas.

After having read a great deal on the subject of salvarsan, in the treatment of syphilis, it seems to me that a great mass of what has been written comes from sources that are more or less prejudiced, either for or against this drug, and is therefore very confusing. Those who believe in salvarsan, believe it does wonders and try to prove it, while those who are sceptical go to the other extreme by picking all manner of faults and exaggerating them.

Suppose that for any cause the complications arising from the treatment of syphilis with mercury had been given as wide publicity as those after the use of salvarsan. How often do we see patients in the late secondaries and all the degrees of tertiary syphilis, who have been supposedly cured by mercury in the past. However, we have seen so many of these that they have occasioned us no surprise. If, on the other hand, we find a patient developing eye or kidney symptoms after the administration of salvarsan, we are sure to notice it and very likely to publish it as a warning to the profession against this drug. Salvarsan is a powerful drug and a poison, so we should expect a great many bad results from it in the hands of the careless or inefficient doctor. The very knowledge of the toxic possibilities of "606" will, I believe, make it a safer drug than mercury, which is so indiscriminately given by the same class of doctors and sometimes with such dire results.

As to a cure, I do not think anyone can prove it an absolute cure any more than they can prove that mercury is. The proof of the cure now depends upon the lack of manifestations of syphilis for the rest of the patient's life. The Wassermann and Noguchi reactions are now helping us a great deal and no doubt will continue to improve until they are reliable in all cases under certain conditions.

We now know that salvarsan will remove the symptoms and manifestations of syphilis in a much shorter time than mercury will. We know that it will give a negative Wassermann much sooner than mercury, and we also know that there is often a relapse, which nearly always occurs with mercury unless it is continued over a long period.

We have had ample time to find out the weak points in the old treatment of syphilis, and we shall no doubt find a great many in the new with possibly the ultimate combination of the two methods. But no matter if the effect is not a lasting one. Salvarsan has proved its usefulness in those resisting and destructive cases of syphilis, which will not respond

soon enough to mercury to prevent the destruction of tissue and disfigurement, and it is worth all we can say in its favor for this alone.

None of the following cases is given as cured, as they have all been too recent to tell anything about that, but they do show marked immediate improvement. These cases are three of the worst I could find and had been on mercury and iodide in all forms before and after coming to Hot Springs.

They had all failed to respond to any treatment and all were getting constantly worse.

CASE I.—Mr. P—, aged twenty-eight years. In March, 1909, had chancre on penis, which was allowed to persist without treatment, and was followed by the secondary stages.

Arrived in Hot Springs in October of the same year with tertiary syphilis. Nearly all his hair was gone, had several ulcers on his scalp, ulcers the size of a twenty-five-cent-piece over his arms and legs, some of which were very deep. We treated him with hypodermics of mercury and by inunctions, and, by keeping him at the point of salivation, we could prevent the disease from progressing. However, he was in great pain from the ulcers and it was impossible to keep him constantly on such heroic doses. My service at the St. Joseph's Infirmary ended January 1st, 1910, and I lost track of him until January, 1911, when I again went on duty in the free ward. I found Mr. P— in a very much worse condition than when I had first seen him. His body was covered with pigmented spots from old lesions, and there were about twenty active ulcers on different parts of his body. The right upper eye-lid had been eaten off and scarred until it was impossible for him to close the eye. The sclerotic was red and the eye very weak and watery from constant strain. He was still in great pain and had been in the hospital for most of the time for fifteen months. Examination, having shown that his eyes were normal, and finding no contraindications in the urine, heart, or blood, I gave him at noon on January 4th, 0.5 gm. of the neutral solution intramuscularly. He had been having some fever right along, temperature on January 3rd being 99° F.

There was no elevation of temperature following. At 9 p. m., on the 5th, temperature was 100.2° F., pulse 96. January 6th, 6 p. m., temperature 99.5° F. On the 7th it dropped to 98.8° F., on the 8th reached 99° F., and on the 9th returned to normal, and has remained so. The patient complained of some pain on the evening of the 4th, which lasted about six hours, followed by a numb sensation that lasted until the 10th, after which there was no unusual sensation of any kind except a little pain on deep pressure.

Pain stopped in all lesions within twenty-four hours. On the second night, the patient slept, without the aid of analgesics, for the first time in several months. All lesions began to take on a better appearance by January 10th, some of the lesser scabs already falling off. Patient left the hospital on January 16th, and went to work feeling fine and strong. January 22nd the last scab fell off and there is no mark of the sores except the scars which are healthy. Patient has had no mercury, iodides or local treatment of any kind since taking "606."

CASE II.—Mr. J—, aged thirty-seven years. Had chancre on the penis in 1903, followed by secondaries in the usual way. Pain started in nose four years ago and patient came to Hot Springs and commenced treatment. Soon after arriving here his eyes became weak and patient found it necessary to wear glasses. The nose became worse and glasses had to be changed several times. I saw the patient a number of times during 1910, but he finally grew so weak

that it became necessary for him to seek aid at the hospital. When I took charge of him in the ward January 1st, 1911, the bridge of nose had entirely broken down, besides which there was an infection and breaking down of the left antrum. His face was so swollen that he could not open his eye, and the odor from the discharging antrum kept him nauseated. He had taken mercury in every form in the last few years, and had constantly gotten worse.

Blood examination demonstrated malaria, but other findings being about normal, I gave him "606," 0.5 grm., at noon on January 9th, his temperature at that time being 99° F. On the following day the temperature reached 99.8° F., and the patient complained of a dizzy sensation, but no pain to amount to anything. Pain was not severe enough to require the administration of an anodyne, and patient had a good night's sleep. January 11th, temperature reached 101.2° F., with some complaint of chilly sensation, but no pain in nose or cheek, and discharge from antrum about stopped. January 12th, temperature 100° F. Patient had a good night and awoke with very little pain at the site of injection. January 13th, temperature 100.2° F. All symptoms much improved and no plasmodia to be found after careful microscopical search. January 14th, temperature 100° F., and feeling better. January 15th, temperature 99° F., and all symptoms better, there being no pain from any of the lesions. January 16th, patient left the hospital and went to work for the first time in several months. A peculiarity of this case is that he has taken off his glasses and says he does not need them. An oculist, who examined his eyes, reports them much improved in accommodation. The inflammation stopped January 12th, and he is working steadily. This patient's memory was affected so that it required several minutes for him to think of his name. He also had dizziness and slight ataxia. All this has stopped.

CASE III.—Mr. B—, aged twenty-one years. Had chancre of the penis August 20th, 1909, followed by the usual secondaries, the initial lesion persisting. Came to Hot Springs in October and received the regular treatment, but there being no response, was given hypodermics of mercury, also soamin, still with no results. I first saw him January 11th, 1911, at which time he had three large, deep ulcers on the glans penis, it being necessary to split the foreskin to permit dressing. He had a fresh mucous patch on upper lip the size of a ten-cent-piece and the throat was so sore he could hardly swallow.

Finding no contraindications, I gave him on January 10th, at noon, 0.6 grm. salvarsan, his temperature at that hour being normal. At 6 p. m., the same day, temperature reached 100° F., falling to 99.8° F. at 9 p. m. On the following day the temperature reached 101.2° F., pulse 90. The patient had a good deal of pain during the afternoon and evening following injection, but did not have to take anything for it. January 12th, temperature 99.7° F., pulse 84. January 13th, temperature 99° F., pulse 88.

By this time all lesions were looking and feeling better and patient was able to eat without any inconvenience in swallowing. January 14th, patient was feeling a great deal better and the temperature was normal. Patient left the hospital January 16th, with all lesions on penis healed and only one mucous patch remaining. By January 22nd there was no sign of an active sore, and all scars were appearing healthy. The patient took a job shoveling coal for one of the large hotels and gained rapidly in strength and vigor.

A peculiar point in regard to this case is that I allowed the patient to smoke as many cigarettes as he wished, the mucous patches healing in spite of it.

I have given salvarsan to several other cases in the last few days, none of which was nearly so bad as any of the previous cases and all are doing wonderfully well. None of the patients had enough pain to amount

to anything, one patient leaving the hospital the day following injection, another on the third day.

I try to keep them in bed for five days, but, unless they feel some soreness, it is hard to do. I used the neutral solution of salvarsan in 10 c.c. of water and have given it in all cases in the gluteal muscle of one side.

It seems to me that these cases justify the use of salvarsan, at least under certain conditions. These are the first three patients to whom I administered it in the hospital and none of them possessed any peculiarities, except that it would be difficult to get hold of three such cases at one time anywhere but in Hot Springs.

PRIMARY CARCINOMA OF THE APPENDIX VERMIFORMIS.

By MAX W. MYER, M. D., of St. Louis.

One cannot hope in a consideration of primary carcinoma of the appendix to present anything new. So little is known, however, of the real frequency of the condition, that it behooves us to report all cases, so that some true data may be compiled. The frequency is variously estimated from $\frac{1}{3}$ to 3 per cent. In 1900 Hurdon was able to collect only 10 cases from the literature, while in 1903 Elting had collected 24. Baldauf in 1905 found 37 authentic cases, and the recent literature contains 105 cases, reviewed by McWilliams. This rapid increase must be explained in two ways—namely, the great increase in the number of cases of appendicitis operated during this decade, and the more frequent microscopic examinations of the appendices removed. The gross neglect of the latter continues to be the cause of our incomplete statistics.

The case to be reported is Miss C., aged twenty years. She had an attack of typhoid fever three years ago since which time she has suffered with cramps in the lower abdomen and severe constipation. In the past three months these cramps have been very severe and of longer duration. Has a feeling of fullness in the epigastrium after meals, with eructation of gas. Has never had an attack so severe as to confine her to bed or to cause nausea and vomiting.

Physical examination negative, except for an exquisitely sensitive area in the right iliac region. Meltzer's sign is positive. Stomach analysis reveals an absence of hydrochloric acid.

Diagnosis.—Chronic appendicitis.

Operation, August 24th, 1909.—Appendix fixed by light adhesions, removal simple, normal convalescence.

Description of Appendix.—Appendix is about three inches in length, with stiff and thickened walls,—a typical fibrous appendix. Its tip is bulbous and hard, apparently due to a new tissue-formation. The lumen of the appendix is patent, with a slightly congested mucous membrane. At the tip is a yellowish circumscribed growth, about the size of a pea. The mucous membrane at this point seems to pass directly into the small tumor.

Microscopic Examination.—The growth is composed of nests of spheroidal cells, with a well-developed stroma and rich blood-supply. The mucous membrane is in great part destroyed in this area by the growth, showing in only several places normal glands. The submucosa is likewise freely invaded by the growth, but at no point does it invade the

muscularis. Slight round-cell infiltration in the superficial surface of the growth.

The appendix should offer a rich field for the study of the early development of carcinoma and in this regard differs from the remainder of the gastro-intestinal tract, where the growths are slow in developing and rarely recognized until very late. As far as all observations have led up to the present time, carcinoma of the appendix is also very slow in its development, and it is to be regarded as comparatively benign. This latter cannot be explained upon the grounds of any great difference in the cytological structure of the growth, but is, I think, to be accounted for upon clinical lines. Fortunately most appendices whose walls are harboring the developing cells of a carcinoma, have either been previously involved in a pathological process,—which makes the diagnosis of appendicitis possible,—or the developing growth will itself possibly produce such symptoms. Several cases have been reported, however, of well-developed carcinoma found at autopsy, without any previous history of symptoms.

With the diagnosis of appendicitis, usually follows the removal of the appendix and consequently the early removal of what would in other organs be permitted to develop until it became a far-advanced growth, with its late symptoms.

We are accustomed to regard carcinoma in the young, as a far more serious condition than in the old, on account of the rapid development and early production of metastases, due to a very active lymphatic system. The appendix here, too, offers the exception. The average age for the development of these growths has been reckoned at twenty-eight to thirty. The youngest case being reported in an eight-year-old child. The explanation of this, too, seems to be clinical rather than pathological. It is not improbable that carcinoma advanced to that stage at which we are accustomed to find those of the appendix, could be found at a corresponding age in many organs, could routine examinations be made.

How many organs could be affected clinically in any way by a carcinoma, corresponding in early development to those which we find in the appendix? This difference is very apparent if we compare the course of a carcinoma of the small bowel,—where a diagnosis is never made until obstruction develops,—or a carcinoma of the pylorus of the stomach, with its obstruction.

One might quote the very infrequent occurrence of metastases in carcinoma of the appendix, (McWilliams finding only 6 per cent. with secondary growth) as representing a pathologically benign tumor, for we occasionally meet neglected cases, in which the appendix has not been removed early. It must not be overlooked that cases deemed as primary carcinoma of the appendix are those in which the cecum has not been involved. When this exists, they have been regarded as too far advanced to find the primary growth. This unfortunately places us

in the same predicament in the neglected and advanced cases of carcinoma of the appendix, in which we find ourselves with regard to all advanced carcinomata. Again, acute appendicitis with sloughing must undoubtedly remove many primary carcinomata which would otherwise be permitted to develop to the late and advanced stages. The growth is undoubtedly clinically benign and only one case has been reported,—that of Lejars, in which the removal of the involved appendix was later followed by a secondary development in the cecum and death. McWilliams would compare these growths with rodent ulcers and epulides, rather than with alimentary tract carcinomata.

The location of the tumor in the appendix favors its slow growth and slow spreading, over 75 per cent. being situated below the middle of the appendix. No appreciable difference is noticed in the malignancy of the different types of tumors,—the spheroidal-cell type being found in 53 per cent., the columnar in 35 per cent., and the remainder as scattering types. These tumors have been found associated with all types of appendicitis, but the obliterative type seems to have existed in a slight majority of the cases. This is especially emphasized by those who maintain that misplaced cells and chronic irritation are prime etiological factors of carcinomata.

There are no symptoms pathognomonic of early carcinoma of the appendix. The symptoms of appendicitis are recognized early and possibly occur early in carcinoma, since the growth may have the same effect as does a fecal concretion. This will continue to make the treatment and results entirely satisfactory, even if the primary carcinoma cannot be diagnosed as such from a definite symptom-complex.

The treatment consists in the removal of the appendix. Few appendices are recognized as malignant until the tissue has been subjected to a careful microscopical examination. Should the appendix look suspicious or show a circumscribed tumor, it would be well to make a wide dissection of the meso-appendix and remove any enlarged glands. If the growth is situated at the base of the appendix one should cut out a small piece of cecum, otherwise the simple appendix technique may be employed.

MEDICAL AND SURGICAL PROGRESS.

INDUSTRIAL DISEASES AFFECTING THE NERVOUS SYSTEM.

A REVIEW OF RECENT LITERATURE.

By SIDNEY I. SCHWAB, M. D., of the Editorial Staff.

1. Teleky: Zur Kasuistik der Bleilähmung. Ein Beitrag zur Edinger'schen Aufbrauchtheorie. (*Deutsche Zeitschrift fuer Nervenheilkunde*, Vol. 37, pp. 234-304, 1909.)
2. Mott: Examination of the Nervous System in a Case of Chronic Lead Encephalitis. (*Archives of Neurology and Psychiatry*.)
3. Kehrer: Ueber Abstinenzpsychosen bei chronischen Vergiftungen (*Zeitschr. f. d. ges. Neur. u. Psych.*, III., Heft 4.)
4. Shrumpf and Zabel: Klinische und experimentelle Untersuchungen ueber die Antimonvergiftung der Schriftsetzer. (*Archiv. fuer experim. Pathol. u. Pharmacol.*, LXIII., Heft 3 u. 4, 1910.)
5. Sicard and Bloch: Paralysie générale et saturnisme. Réaction de Wassermann. (*Rev. neur.* 18, 2, 118, 1910.)
6. Bergonia: Traitment des Accidents Causés par L' Electricité Industrielle. (*Paris Médical*, December 10th, 1910.)
7. Auerbach: Ein Fall von Kupferneuritis. (*Zeitschr. f. Nervenheilk.*, Bd. 39, s. 115, 1910.)
8. Thebault: Telephone Operators' Neurosis. (*Presse Méd.* No. 66, p. 630.)
9. Bing: Beitrag zur Kenntniss der industriellen Vergiftungen mit Methylderivaten. (*Schweiz. Rundsch. f. Med.*, 1910.)
10. Knierim: Ueber eine seltenere Lokalisation von abgelagertem Schwefelblei bei chronischer Bleivergiftung. (*Deutsche med. Wochenschr.*, No. 42, 1910.)
11. Sternberg and Grossmann: Zwei bemerkenswerte Fälle von Arbeitertetanie. (*Deutsche Zeitschr. f. Nervenheilk.*, Vol. 39, Heft 5 u. 6, 1910.)

The increasing interest which industrial diseases has awakened among sociologists, economists, and hygienists, as reflected in the legislative enactments in various states in this country and Europe, more particularly as is shown by the Labor Legislation Meeting recently held in St. Louis, has suggested a review of recent literature on industrial diseases, particularly as it affects the nervous system.

Lead is the most important poison used in the industries which shows its primary effect on the nervous system. It is used in many kinds of

trades, and the customary lack of protection to workers accounts probably for the great number of papers which are found on this subject. Among the most interesting is that by Teleky of Vienna (1), who, by the way, is a *privat-docent* for sociological medicine. This paper is a contribution, not only to the frequency and occurrence of lead poisoning in the trade, but is likewise a valuable piece of work directed towards the explanation of the selective action of lead poisoning upon certain groups of muscles. It has heretofore been believed that lead, like many other poisons, has the power to select certain muscles or muscle groups to be the seat of degenerative process. Teleky's theory is based upon Edinger's exhaustion theory. This in brief explains the selective action of poisons by the fact that the peripheral or any part of the central nervous system, which becomes exhausted, offers less resistance to any kind of poison.

Teleky shows that the muscles used by the worker in lead, either excessively or exclusively, are the ones that are paralyzed by the lead. In painters the pronators and extensors are affected most frequently; in other workers similar conditions were found, so that from a large material and a careful analysis of individual cases he comes to the conclusion that lead has very little selective action as such; that the picking out of individual muscles or muscle groups to the nerves supplying them is practically always due to the over-use of these muscle groups; and that the muscles which are most strongly and frequently used are the muscle groups that succumb most readily to lead poisoning. F. W. Mott (2) describes a condition which closely simulates that of dementia paralytica. He finds the blood-vessel walls of the artery and veins degenerated, hemorrhages scattered throughout the brain filling in the perivascular spaces. The neuroglia is increased both in the white and in the gray matter. It is interesting to note that in this case of Mott's the patient was in a delirious condition closely approaching the clinical picture of lead psychosis. The changes that are found in the case are so suggestive of dementia paralytica that it seems to support the contention of certain German neurologists that lead does not produce any special form of insanity, but that the majority of cases are real paretics. Another interesting fact of this study is that the chemical examination of the brain showed no traces of lead.

Kehrer (3) gives an interesting description of the cases of two painters, one fifty-two years of age, the other twenty-five, who worked with oil colors, and were both acutely affected with psychosis. In this paper there is a clear description of the various pathological findings in cases of lead poisoning. He calls special attention to the recent differentiation between lead meningitis and lead encephalopathy. The following four forms are recognized: First, a latent variety recognized only by the findings in lumbar puncture, lymphocytosis and increase in pressure; second, incomplete appearing with colic, shown by headache, vomiting and increase of reflexes; third, an acute or subacute precocious form found especially in young individuals, a meningitis symptom complex, epileptic form, a delirious symptom complex; fourth, a late developing acute or subacute form recognized by headache, vomiting, slowing of the pulse and paralytic symptoms. The conclusion to which this author has come is that on account of the great varieties of psychical symptoms found in lead poisoning there is no characteristic symptom complex. Lead of itself can cause any kind of physical disease and can be considered in the words of Beer as metallic narcotic and stands in similar position to that of alcohol.

Shrumpf and Zabel (4) take up the subject of lead poisoning in typesetters, and bring out the interesting fact that a true lead intoxication is seldom met with in this profession, although lead poisoning is frequent enough. On account of the alloy used, an antimony poisoning follows, especially found in youthful workers; after the thirtieth year it is seldom found. The usual symptoms are nervousness, irritability, insomnia, generalized fatigue, vertigo, headache, pain along the muscles or nerves, intestinal disturbances, definite lessening of leucocytes, eosinophilia, lowered blood-pressure, antimony in the stools. Prognosis is usually good. It is well to remember that the statistics of lead poisoning in typesetters is probably incorrect on account of the prevalence of the antimony poisoning in that class of workers.

Sicard and Bloch (5) demonstrated a case of supposed psychosis due to lead poisoning with symptoms strongly suggesting dementia paralytica. The examination of the spinal fluid showed a positive Wassermann which made the diagnosis of paresis certain. This is in line with the assumption of many German neurologists that lead does not produce any definite and characteristic form of mental disease.

Bergonia (6) discusses briefly the treatment of accidents caused by electricity used industrially and gives some interesting data on the causes which act in producing the most serious effects. This depends chiefly on two factors: First, the intensity of the current to which the patient is exposed, and second, the path of the current through the patient's body. The effect of an electrical current upon an industrial worker may be so severe as to cause immediate death or so slight that no trace is left after the first initial shock. The author calls particular attention to the prevalence of hysterical symptoms following electrical actions, especially in such cases in which the immediate effect is rather slight.

Auerbach (7) records a case of a neuritis occurring in a coppersmith, aged forty, which he attributes to copper poisoning. The German neurologists have been doubtful about the occurrence of copper poisoning. The teeth and gums in this case were healthy, and there was no green line to be seen. The patient had pain and weakness in certain muscles of the right upper limb, chiefly in the large proximal muscles, also in the right lower limb, especially in the gluteal muscles. The affected muscles showed partial reactions of degeneration. There was some sensory loss on the outer posterior aspect of the right hand and forearm. The right knee jerk and left ankle jerk were absent. The sphincters were unaffected. The patient improved under treatment, but on resuming his occupation he relapsed.

Thebault (8) describes what he considered a definite type of neurasthenia occurring in the telephone girls of Paris, where the conditions of work are not as hygienic as they should be. The symptoms are those of a general neurasthenia—headache, neuralgia, alteration in temperament, digestive disturbances, constipation, insomnia, loss of self-control. Recommendations for treatment or the removal of the cause and other hygienic measures.

Bing (9) describes two cases of ethyl bromide poisoning, the first with intension tremor in the right arm, the second with an acute polyneuritis chiefly of the sensory type. The latter patient was exposed to the effects of methyl alcohol.

Knierim (10) describes a case of lead poisoning in which the lead deposit of a dark gray color was found in the mucous membrane of the lips. It probably was produced by the rubbing of the mucous membrane

against the teeth which had become decayed and probably covered with the deposit of lead.

Sternberg and Grossmann (11) describe two cases of tetany to which they give the name of workers' tetany (*Arbeitertetanie*). The symptoms of the first case began two months before, in the following way: In the morning on waking up, painful cramps were felt in both hands which lasted about a quarter of an hour. The hands were strongly flexed. These like attacks were repeated in the evenings and the following night. Upon examination it was found that the hands of the patient were in a typical tetany position. The second case, a boy of seventeen years, who worked in the same place and under the same conditions, showed practically the same symptoms. Both boys were zinc worker apprentices. In both of them the strictly tetany symptoms were accompanied by constitutional symptoms of temperature and pulse. In the first case there was a marked degree of spasticity. Frankl Hochwart was the first who called attention to the occurrence of tetany in certain special quarters and among families. He was inclined to believe that this gave support to the infectious theory of the disease. The authors of this paper, however, call attention to the fact that tetany occurs in a great proportion of cases among workers in factories and day laborers, and especially among young individuals, boys particularly who work in the factories where various operations with metal are necessary. Some have declared tetany to be an occupation neurosis. That, however, has long been given up. Some have tried to bring the material which the worker handles into relationship with the recurrence of the disease. This was particularly true for the frequent occurrence of the disease in shoemakers and tailors, but this cannot be accepted as a fact on account of the marked difference of material used in these trades. The conclusions the authors arrive at are interesting. They believe that the so-called workers' tetany is especially to be brought into relationship with the housing of the workers, and is in a sense an epidemic disease, inasmuch as the apprentices in Vienna especially live together and practically no change or improvement is made in their quarters. The workers' tetany is therefore to be considered an industrial disease only in the sense that the workers have a peculiar condition of housing.

THE PATHOLOGY OF THE THYMUS.

A REVIEW OF RECENT LITERATURE.

By ALFRED FRIEDLANDER, M. D., of the Editorial Staff.

1. Pappenheimer: Normal and Pathological History of the Thymus. (*Journal of Med. Research*, February, 1910.)
2. Marfan: Pathology of the Thymus. (*Arch. de Méd. des Enf.*, November, 1910.)
3. Nordman: Experimental Studies on Thymus. (*Arch. f. Klin. Chir.*, xcii, No. 4.)
4. Klose: Thymus Extirpation and Its Consequences. (*Arch. f. Klin. Chir.*, xcii.)
5. Biedl: Innere Sekretion (1910), p. 108 ff.
6. Lucien and Parisot: Thymus Extirpation. (*Arch. de Méd. Exper.*, January, 1910.)

The most important recent contribution to the histopathology of the thymus gland is that of Pappenheimer. As a result of his studies Pappenheimer concludes that the thymus is not a lymphoid structure. It has no definite capsule nor peripheral lymph sinuses containing lymphocytes. It has no fibrous reticulum such as is common in all lymphoid tissue. The reticulum of the thymus is formed by anastomosing protoplasmic processes given off by the reticular epithelial cells. Normally, there are no connective tissue fibres demonstrable within the lobules save those accompanying the blood-vessels. There are slight but distinct morphologic differences demonstrable between the small thymus cells and true lymphocytes.

There are no germinal follicles in the cortex.

The thymus contains peculiarly differentiated structural elements such as are never found in true lymph glands. These are (a) mononuclear oxyphilic granules, (b) Hassall corpuscles, (c) myoid cells.

It seems probable that the thymus must be classed as an epithelial rather than as a lymphoid organ.

While it is probable that the thymus is an organ of internal secretion, it is certain that structurally it bears little resemblance to the other ductless glands, with the single exception of the epiphysis cerebri. What the active secreting elements are and how the secreted substance is elaborated are questions not to be answered as yet.

The normal involution of the thymus. If we take the entire weight of the gland as a guide we are forced to the conclusion that development proceeds gradually to reach its maximum at the fifteenth year (completion of puberty). During the next five years the weight of the gland diminishes rapidly, and from the twentieth year more gradually. But the total weight of the gland is not an absolute index of the functional activity of the gland. Pappenheimer thinks that it seems certain that the

thymus is in an evolutionary state up to puberty, involution beginning at this time rather than in early childhood. Other authors, notably Biedl, (in his recent work on "Innere Sekretion") are of the same opinion. (By many, however, the view is held that the period of greatest functional activity of the thymus is the first two years of life, that functionally the thymus plays a gradually decreasing rôle thereafter, even though physical involution does not begin before puberty.) The essential features of involution are a gradual disappearance of the parenchymal epithelium and a replacement with fat and connective tissue. Normally there is no invasion of the lobules with connective tissue so that the natural involution is in no sense a sclerosis of the gland.

In a series of carefully studied cases of status lymphaticus, Pappenheimer finds absolutely *no* characteristic changes in the thymus, other than the simple hypertrophy. In diseases of the ductless glands (Basedow's, Addison's, and acromegaly) Pappenheimer finds simply active proliferation of the thymic elements and absence of regressive changes. In certain of the infectious diseases there is nearly always a distinct atrophy (fibrosis) of the thymus. In some of the acute infections there is a marked destruction of thymus tissue, in chronic diseases this is accompanied by a replacement hyperplasia of the connective-tissue.

The most complete recent summary of the clinical pathology of the thymus is that of Marfan.

Discussing hypertrophy, he finds that in this condition there is a marked hyperplasia, particularly of the lymphocytes, with hyperemia. The engorgement of the vessels doubtless plays an important part in the production of symptoms. A simple hypertrophy occurs to some extent in the acute infectious diseases, but is more apt to occur in the chronic infections such as syphilis or tuberculosis, also in rickets, in certain diseases of the ductless glands and in some cases of congenital heart lesion. It also forms a part of cases of so-called status lymphaticus, where in addition to the enlarged thymus, we have a hyperplasia of the lymphoid structures throughout the body (tonsillar ring, lymph-glands, spleen, intestinal follicles, together with the hypoplasia of the arterial system.)

Hypertrophy is most common in the first two years of life, but is not limited to this period as it may occur even after puberty.

Premature atrophy of the thymus is found in cases of athrepsia and is to be regarded as an effect rather than a cause of the disease.

The symptoms of thymic disease (by which in the vast majority of the cases is meant thymic hypertrophy), are to be explained as effects dependent upon mechanical compression of neighboring organs, especially the trachea, or effects due to the toxic action of internal thymic secretion. The physical signs of enlarged thymus are of great importance. By percussion, the enlarged thymus may be made out without great difficulty in the majority of cases. Blumenreich has shown that the normal thymus dulness is in the shape of a truncated cone whose base is the sterno-clavicular junction and whose apex is at the level of the second rib. Laterally, the normal thymus should not project more than 6 cm. beyond the sternal margins. Increase of the lateral diameter therefore means enlarged thymus. The *x*-ray offers information of great value in the diagnosis of enlarged thymus as first pointed out by Hochsinger. A typical broadening of the normal thymus shadow is found in most cases of enlarged thymus. This picture can sometimes be obtained when even percussion is negative.

The symptoms of thymic compression are those usually summed up

in the picture of so-called thymic asthma. There is usually a marked inspiratory stridor. With this there is a change in the shape of the chest, an increase in the antero-posterior, a decrease in the lateral diameter of the chest. Often there are violent paroxysmal attacks of violent dyspnoea with cyanosis. The compression of the trachea by the thymus always takes place at the same level, the superior strait of the anterior mediastinum. The antero-posterior diameter of the strait never exceeds 2 cm. in early life (so-called "critical space" of Grawitz) and a hypertrophied thymus often has a thickness exceeding 1.5 cm. The possibility of tracheal stenosis at this age, when the rings are soft and the space narrow thus becomes great. Compression of the great vessels may of course also occur with the attendant consequences. Even the esophagus has been severely compressed in a few cases.

As is well known, in these cases of hypertrophied thymus, especially when found in lymphatic subjects, sudden death is not uncommon either after slight trauma, mild infection, anesthesia, or without assignable cause. A definite explanation for the sudden death in these cases, at least for the mechanism of its production, has as yet not been found.

Svehla's theory of hyperthymization of the body lacks confirmation as yet. The diagnosis of hypertrophied thymus is often extremely difficult. In the first place in many cases the hypertrophied thymus per se causes no symptoms. In all cases when there is a suspicion, especially where there is enlargement of the lymphoid tissue and of the spleen, careful percussion and radioscopy of the thymus area should be made routine procedure.

In the cases with thymic asthma, either continuous or paroxysmal, the diagnosis is easier. The association of thymic asthma, with enlarged percussion area and enlarged radiographic shadow of the thymus will permit the diagnosis of enlarged thymus, and this in conjunction with hyperplasia of the lymphoid structures of the body and enlarged spleen, will in turn justify the diagnosis of status lymphaticus.

(Examination of the blood in such subjects, if they be under two years of age, will show a constant lymphocytosis.—Editor.)

Treatment.—In mild chronic cases, Marfan recommends general tonic treatment, because it is well known that the symptoms tend to disappear, or grow less marked toward the end of the second year, when the normal involution of the gland begins.

In the serious cases, however, medicinal treatment is of no avail. Here we must have recourse to (a) introduction of long cannula into the trachea, (b) surgical measures, (c) radiotherapy. Intubation is impossible, inasmuch as the tube cannot remain in place long enough to be of avail without causing dangerous complications. Thymectomy has been successfully practiced a number of times, radiography has been used successfully also. Klose has recently contributed a report on thymectomy for tracheostenosis for enlarged thymus. Rehn has collected 21 cases of thymectomy, with sixteen recoveries. According to Klose's studies, which were largely experimental, the thymus is a vital organ which may not be completely removed during its period of functional activity, without grave danger to the development of the organism. After complete thymectomy (in the human being as well as in the lower animals) there are produced grave symptoms of acid intoxication, probably nucleinic acid poisoning, and diminution of the calcium salts. Later on, as has been shown by experiment, if the animal or child survive, there are grave changes in the osseous and central nervous systems.

Klose is convinced, however, that partial thymectomy, even at the height of functional activity, will not cause permanent damage. It would appear that when a large part of the thymus is thus removed, that the spleen is the organ of functional substitution.

Nordman has also made a study of the effects of thymectomy. He could not agree with the findings of Basch and Klose, upon thymectomized dogs, but he found that complete thymectomy was always followed by death within twelve months.

Lucien and Parisot find that thymectomy produces very marked metabolic changes, especially in central nervous and osseous systems. They used rabbits instead of dogs.

(Aside from the question of the after-effects of thymectomy which are certainly serious, it is to be borne in mind that the operation itself is exceedingly dangerous. It seems important therefore to call attention again to the value of the x -ray in the treatment of this condition. Marfan refers to one case successfully treated by the x -ray, reported by the author of this review. Since the case was reported, five more have been successfully treated, and a series of animal experiments have shown that it is perfectly feasible to cause fibrosis of the thymus and shrinkage in size in animals. A detailed report of the work is to be published in the near future.—Editor.)

THE AFFECTIONS OF THE KNEE.

A REVIEW OF RECENT LITERATURE.

By NATHANIEL ALLISON, M. D., of the Editorial Staff.

1. Watson: Treatment of Tuberculosis of the Knee. (*The Practitioner*, March, 1910.)
2. Ely: A Study of Joint Tuberculosis with an Original Theory as Its Localization and a New Plan of Operation Based on the Pathology. (*Surgery, Gynecology and Obstetrics*, June, 1910.)
3. Hazen: Traumatic Affections of the Knee-Joint. (*Long Island Medical Jour.*, March, 1910.)
4. Drehmann: The Para-Articular Correction of Angular Ankylosis of the Knee. (*Zeitschr. fuer Ortho. Chir.* B. XXV., 1910.)
5. Myers: Cases of Transplantation of the Flexor Muscles of the Knee to Increase the Power of the Extensor Muscles with Remarks on the Indications for the Operation. (*St. Luke's Hospital Report*, Vol. I., 1908-09.)
6. Jones: Notes on Derangement of the Knee. (*Annals of Surgery*, January, 1910.)

Watson believes that there are two kinds of knees worth having, a movable stable knee and a fixed straight knee. Where the knee has been infected with tuberculosis he believes that operation should have for its object the production of a stiff straight knee. Erosion will seldom produce this result and the resulting fibrous ankylosis means flexion and failure. In young adults, therefore, excision is the best operation. In children tuberculosis is bad enough but erosion and excision are worse. All uncomplicated cases should be treated by conservative methods. An operation should only be done where there is abscess formation.

Ely believes that only two tissues in a joint, the synovia and the red marrow are subject to tuberculosis. These tissues disappear in a joint which has been deprived of its function and consequently the disease dies out, therefore the treatment of tuberculous joint disease should consist chiefly of depriving the joint of function. He does not believe with Nichols that joint tuberculosis always originates in a bony focus but is of the opinion that tuberculosis is often primarily synovial. He explains the pathology of the bone focus in this way: The primary infection is in the marrow of the epiphysis and the tuberculous granulations advance in the marrow surrounding the trabeculae shutting off their nutrition and killing them altogether with the formation of sequestrum or of small particles known as bone sand. This tuberculous tissue growing in the marrow reaches the joint. The cartilages of the joint act as barriers to its progress, but they are either perforated or the granulations shut off their nutrition and lift them like a leaf, or the granulations travel under the cartilages and reach the joint at the side. During this process the

joint is the seat of serous effusion. Where the disease is primarily synovial he believes the tubercle is deposited in the membrane itself. In bone tuberculosis the only tissue that is directly affected is the marrow. The entire pathological process seems to show an effort on nature's part to abolish function and to deprive the joint of motion. It is the author's opinion that any operation which causes the epiphysis to lose their cancellous structure will cause a disappearance of the disease at that spot, and any operation which deprives the synovial membranes absolutely of function causes them to lose their distinctive structure and cures the tuberculous disease in them; therefore, in children protection of the joint, meaning by this, the abolition of function, will suffice for a cure, and in adults it is only necessary to excise such tissue as will deprive the joint of function. These observations are all particularly interesting in their application to tuberculosis of the knee-joint.

Hazen has shown that the human knee is more prone to injuries and resulting disease, on account of its anatomical structure, than are the knees of the lower animals. He believes that the unstable mechanical nature of the knee joint exposes it to constant injury and consequently to disease. The indirect injury is a more potent cause of disease than is the direct. The inner condyle of the knee is more frequently the seat of trouble than is the external and he explains this by pointing out the fact that the range of motion at the internal condyle is greater. He believes that exploratory operations should be more frequently employed to determine definitely the condition in doubtful cases of knee affection.

Drehmann gives the following reasons for objecting to excision of the knee. When the operation is severe the posterior capsule must be stretched in order to correct a severe deformity and there may result peroneal paralysis and embarrassment of the popliteal artery. Severe deformity requires so large a wedge to be removed that considerable shortening results. As a substitute for this in severe cases of angular ankylosis of the knee he recommends an osteotomy of the fibula several centimeters below its head, care being taken to avoid the peroneal nerve. Osteotomy of the tibia through an anterior incision beneath the tubercle, obliquely from below upward and from before backward. A thorough stretching of the soft parts in the popliteal space, using the legs as a lever. A section of the soft parts is superfluous, or even injurious. Finally, a supracondylar osteotomy of the femur obliquely from before backward and from above downward. The knee is straightened to a slightly obtuse angle and dressed in plaster. At the end of eight days cast is removed, sutures removed from the incisions and a full extension of the knee-joint made under a brief anesthesia. Plaster applied with knee in full extension. This second redressment is important in preventing a too great dislocation of the fragments at the first operation.

Myers has reported two cases of inability to extend the knee where the hamstring muscles had power. In both of these the internal hamstrings were transplanted into the quadriceps tendon and in both cases walking was possible without any support to the knee.

The article of Jones on "Derangements of the Knee" is based upon an experience of over 500 operations. The cases of injury to the cartilages are usually accompanied by a history of strain or injury, the initial displacement as a rule being the most severe. In his series the external semi-lunar was affected in only 7 per cent. of the cases, the internal cartilage being more frequently involved on account of its anatomy. Being more firmly fixed by ligamentous attachment than the external it is

bound to give way after certain motions of external rotation. Of the 117 cases operated upon 7 were displacements of the posterior horns; 12 were fractured transversely opposite the internal lateral ligament; 8 were loosely bound circumferentially with no other appreciable abnormality; 8 had undergone changes in the loose anterior extremity of the semilunar of a nodular type, some being as lumpy and large as a pea; 3 exhibited no trace of the cartilage; and 2 showed the anterior part doubled and adherent to the posterior part. In the other cases classification was not possible; some cartilages were friable and others presented fringed edges. The differential diagnosis of displaced semilunar cartilages includes the consideration of synovial fringes; loose bodies; lipomata; osteomata; and rupture of the crucials, and the author gives his ideas on the clinical points which separate these conditions as follows: The symptoms of the nipping of a synovial fringe are less acute in its primary occurrence than are those of a displaced cartilage. The pain is strictly local and is not participated in by the internal lateral ligament. Frequently a prominence may be found over the site of pain, and no matter how often the nipping occurs effusion follows, creaking in the joint is a frequent accompaniment, and often an obvious swelling occurs on each side of the ligamentum patellæ (due to the chronic thickening of the infrapatellar pad). Loose bodies can usually be found and isolated by the patient. They often lock the knee but only transitorily. The symptoms are sharp but not acute, and unless pedunculated they may be referred to different places. Effusions are common. Lipomata will sometimes lock the joint. There is often swelling about the lower part of the patella and painless effusions. Exercise rather than accident produces the symptoms which are rarely acute, and pressure on the knee will produce no pain. Osteomata can be found by manipulation and by radiography. They sometimes lock the joint when a muscle or tendon becomes entangled. Rupture of the crucials is the accompaniment of so severe an injury that other structures participate in the general strain. The tibia can be made to glide in a to-and-fro direction, and when the knee is flexed lateral movements are free. If the lateral ligaments are torn, lateral movements in the extended position are also free. As to the indications for operation the author gives the following rules: "In the first place, I refuse to operate in any case I see early, the subject of a first derangement. I discourage operation in those recurrent cases where the symptoms are transient and not followed by irritation of the joint. I strongly urge operation in those cases where a recurrent displacement is at times followed by acute symptoms. I advise it in all recurrent cases where a strenuous athletic life is a means of livelihood or a physical necessity. I think operation absolutely imperative in the case of men who work or stand in dangerous places and where a yielding of the knee may lead to serious consequences. Practically age has no influence over me if the indications I mention are present. I have operated upon a boy of fifteen and a woman of fifty-four.

"Is there any danger apart from periodic trouble in a slipping semilunar? I can clinically support Mr. Arbuthnot Lane when he says it may prove the exciting cause of tubercle. Frequently I have examined patients with tubercular knees and patients with rheumatoid arthritis whose early history was associated with internal derangements of the knees and in several cases of badly recurring injuries I have found sometimes congestion and sometimes erosion of the bone and cartilage upon which they rested."

FIBROMATA OF THE NASOPHARYNX.

A REVIEW OF RECENT LITERATURE.

By W. B. CHAMBERLIN, M. D., of the Editorial Staff.

1. Bond (*Journ. of Laryng., Rhinol. and Otol.*, p. 28, January 1909).
2. Bond (*Proceed. of the Royal Society of Medicine*, Laryng. Sec., p. 37, 1908-09).
3. Canfield (*Physician and Surgeon*, XXXIII., p. 123, 1910).
4. Calhoun (*Laryngoscope*, XIX., p. 934, 1909).
5. Getchell (*Trans. Amer. Laryng. Society*, p. 50, 1909).
6. Hansberg (*Verh. des Vereins deutscher Laryng.*, p. 42, 1910).
7. Lincoln (*Archiv. of Laryng.*, IV., No. 4, October, 1883).
8. Mann (*Memphis Med. Monthly*, p. 348, July, 1909).
9. Nager (*Verh. des Vereins sueddeutsch. Laryng.*, p. 510, 1908).
10. Swain (*Annals of Otology*, XVIII., p. 530, 1909).
11. Tilley (*Proceed. of the Royal Society of Medicine*, Laryng. Sec., p. 96, April, 1910).
12. Wright (*American Textbook*, p. 1091).

Fibroma of the nasopharynx is a fairly rare affection; not so rare, however, as the reported cases might lead one to conclude. Certainly a large number of cases do not fall to the lot of any single practitioner, three being the highest reported by any one man. Lincoln, choosing arbitrarily the years 1867 to 1883, inclusively, could find only 58 cases reported in the literature, 3 of these being his own. In the earlier days before specialism, when these cases came under the care of the general surgeon, the removal of fibromata of the nasopharynx was indeed a formidable operation, involving usually a preliminary tracheotomy and subsequent resection of the superior maxilla, and, if necessary, portions of the other bones of the face. In young subjects the relief was certainly heroic and deaths on the table, or shortly after, were not infrequent. Even after such thorough extirpation the growths in young subjects frequently recurred, while the resulting external deformity was often frightful. In those cases collected by Lincoln which were operated by removal of the bones of the face, 28 cases or over 25 per cent. died upon the table or shortly after. Calhoun mentions two cases operated by colleagues with fatal results from hemorrhage. On the other hand, in defense of the general surgeons, it may possibly be argued that the cases seen by them were more advanced, whereas those seen by the specialist to-day are usually in the early stages of the growth.

Wright in the *American Textbook*, quoted by Getchell defines fibroma of the nasopharynx as "histologically a benign growth, which owing to its situation gives rise to symptoms which if unrelieved are almost certain to result in death. Such growths demand operation. They usually occur in males and between the ages of ten and twenty-five years. This influence of age is so marked that not a few cases are recorded of spontaneous recession of the growth after this period; affording in this re-

spect a marked resemblance to another nasopharyngeal growth—namely, lymphoid hypertrophy or adenoid vegetations.”

These growths spring from the dense fibrous tissue and periosteum which covers the basilar process of the occipital bone and body of the sphenoid. As regards form they may be sessile or pedunculated, single or multilocular. In size they vary from the smallest which may cause annoyance and, therefore, lead to examination, up to extensive masses involving the accessory sinuses, the soft tissues of the neck and face as well as the brain and skull cavity. All operators agree that such growths should be removed thoroughly as soon as detected. Lincoln well summarizes the objects of treatment as:—

(1) The removal of all growths as far as possible together with destruction of tissue at the point of origin.

(2) The avoidance of accidents at or immediately following the operation.

(3) Securing the least external deformity.

The dangers are shock at the time of operation and hemorrhage at the time or after. Extreme shock has been removed or certainly minimized by improvement in technique. Whereas the removal of the superior maxilla and other portions of the bones of the face was the rule of the older surgeons, all seem agreed at the present time that the operation can be successfully performed in practically all cases through the natural passages—the nose and mouth. The extreme vascularity of these growths makes hemorrhage a danger which is ever present, not only at the time but subsequent to the operation. Naturally this danger is greater where the growths are sessile and extensive than when they are attached by a small pedicle. In the former case the preliminary ligation of one or both external carotids is recommended by most operators.

The technique of removal varies in the hands of different operators and according to the conditions met with in various cases. With pedunculated growths the cold- or galvano-cautery snare seems to be an ideal instrument. Difficulty however is frequently experienced in finding a snare sufficiently strong. With sessile growths the use of the snare is hardly possible and biting forceps, scissors or larger and stronger forceps for evulsion must be resorted to. If the mouth or nose furnishes too small a portal of entry to the field of operation a preliminary Denker operation through the nose and antrum will offer increased and sufficient room.

Recurrences are always probable in cases under twenty to twenty-five years. This period is usually spoken of as the immune age.

Various measures have been resorted to in order to prevent recurrences in young subjects before the so-called immune age has been reached. Electrolysis and the cauterizing of tissue at the point of origin seem to offer the best means of prevention. Even these measures are unsuccessful in a large proportion of cases although frequently repeated. Such young subjects must be operated repeatedly whenever the growth reaches sufficient size to produce distressing symptoms.

When the age of immunity is reached the growth remaining will tend to disappear or at least will not recur. One operator even reports disappearance in a case which he had given up in despair and pronounced inoperable. The case was seen by him three years after his final fatal prognosis and no signs of the growth were observed.

The earliest symptom complained of is nasal obstruction, as relief is usually sought before more serious signs such as dyspnea, dysphagia and distortion of the face and neck appear.

DIAGNOSTIC AND THERAPEUTIC NOTES.

THE NEED OF CARE IN THE USE OF IODINE.—Krehl (*Muench. med. Wochenschr.*, 1910, No. 47). The promiscuous use of iodine, especially in cases of arteriosclerosis, is accompanied by certain dangers, the existence of which is not generally recognized. These dangers are dependent upon the obscure and erratic influence which iodine may exercise upon the over-active thyroid gland. Occasionally, as is well known, a goitre may be favorably influenced by iodine medication, but the reverse is so often true that Krehl believes the administration of iodine in this condition to be more dangerous than operation. Again and again, he says, he has seen a latent or minimal hyperthyroidism turn, after a brief course of iodine medication, into a violent and intractable thyrotoxic condition. This mode of iodine poisoning differs from the ordinary iodism, in that the latter ceases after the discontinuance of the iodine, whereas the former is permanent, once it has set in. Moreover, the diagnosis of a minimal hyperthyroidism is by no means easy. The gland does not need to be enlarged. An otherwise inexplicable loss of weight, a persistent tachycardia, various psychic disturbances and the like justify the suspicion of latent hyperthyroidism. In such conditions, iodine should either not be given at all or at least only with the greatest caution.

A MODIFICATION OF THE GIEMSA STAIN.—Giemsa (*Muench. med. Wochenschr.*, 1910, No. 47). Giemsa now advises mixing his staining solution, which may be obtained ready-made from a number of dealers, with an equal volume of absolute methyl alcohol. The mixture so obtained is used much like the well-known Wright stain. The slide, on which the blood or secretion has been spread in a very thin layer, is placed in a Petri dish and covered with ten to fifteen drops of the staining mixture. After thirty seconds, ten to fifteen cubic centimetres of distilled water are added, the whole mixed by means of gentle agitation and allowed to stand for from three to five minutes or longer. The slide is then washed thoroughly in distilled water. The resulting stain is not quite as perfect as with his original method, but the slight difference is more than compensated by the ease and rapidity of the procedure.

In this connection we desire to call attention to the satisfactory results we have obtained by means of the Giemsa-stain tabloids put up by Burroughs, Wellcome & Company. A tabloid is ground up in a small mortar and dissolved in about ten cubic centimetres of absolute methyl alcohol, the resulting solution being used just like Wright's stain. Beautiful specimens of blood or of the spirochæta pallida can so be obtained.

A NEW METHOD OF EXAMINING SPUTUM FOR TUBERCLE BACILLI.—Loeffler (*Deutsch. med. Wochenschr.*, 1910, No. 43). A great advance in our methods of examining sputum, containing very few tubercle bacilli, was made when Uhlenhuth suggested the use of antiformin. Antiformin, which can now be readily obtained, consists of a mixture of sodium hypochlorite and sodium hydrate. It very readily disintegrates and dissolves all sorts of organic substances, including sputum, and destroys all the microorganisms except tubercle bacilli and other acid-fast bacteria. The latter remain practically untouched. A variety of modifications of his method has been advocated, of which that of Loeffler deserves particular mention.

The sputum is placed in a flask, mixed with an equal amount of 50 per cent. antiformin and the whole heated to boiling. A clear, pale-brown fluid results. After cooling, add to 10 c.c. of the solution, 1.5 c.c. of a mixture of one part of chloroform and nine of alcohol. Shake until the chloroform has been completely emulsified. Centrifugate for fifteen minutes. The chloroform is thrown down nearly completely and between the layer of chloroform and the supernatant sputum, a disk of sediment has formed containing all of the tubercle bacilli. This disk is taken out, mixed on a slide with a little egg albumin, which may be kept in stock by adding to it 0.55 per cent. phenol, spread out in a thin layer on a glass slide and stained in the usual manner.

HYPODERMOCLYSIS OF SUGAR SOLUTIONS IN ECLAMPSIA.—Frankenstein (*Muench. med. Wochenschr.*, 1910, No. 45). Since eclampsia is due to a toxemia, the ingestion of large quantities of water is an important element in the treatment. Only so can the toxic substances present in the blood be eliminated through the kidneys and otherwise. The usual method of introducing this fluid, namely, by means of hypodermoclysis of physiological salt solution, involves however a grave error, in that the salt thereby administered, constitutes a serious danger in view of the injured and incompetent kidneys. Attempts have been made to avoid this difficulty by injecting hypotonic saline solutions under the skin or by giving plain water by stomach or rectum. The former method, however, only half eliminates the difficulty, the latter does not insure prompt absorption of the water. The writer believes that the difficulty can be overcome by using a 4 per cent. solution of grape sugar subcutaneously. The injection is nearly painless, it is free from danger and the sugar acts not only as a food but as a diuretic. The method seems clearly worth a trial.

THE THERAPEUTIC USE OF CUTANEOUS INOCULATIONS OF TUBERCULIN.—Poepplmann (*Berl. klin. Wochenschr.*, 1910, No. 42). The diagnostic value of v. Pirquet's cutaneous inoculation with tuberculin is now generally recognized. Poepplmann, however, uses it for therapeutic purposes. The inoculations are done just as for diagnosis, undiluted old tuberculin being used, but are repeated every four to ten days. The treatment is a very mild one and is especially indicated in feeble patients, since strong reactions do not occur. The author's reports seem to show

that the results compare favorably with those obtained by means of tuberculin injections.

THE PROGNOSTIC VALUE OF v. PIRQUET'S CUTANEOUS TUBERCULIN REACTION.—Lichtenstein (*Hygiea*, 1910, No. 9). At one of the Stockholm hospitals, 173 consumptives were subjected to v. Pirquet's test, the results recorded and the patients examined a year later. The following results were obtained:—

1. A negative v. Pirquet reaction in manifest pulmonary tuberculosis indicates an absolutely bad prognosis.

2. A positive, especially a strongly positive reaction lends support to a favorable prognosis, as regards prolongation of life.

3. The cutaneous test is of greater prognostic value than the diazo-reaction.

Our own observations are entirely in accord with the above. (Editor's note.)

PULSATING TONGUE IN AORTIC INSUFFICIENCY.—Minervini (*Sem. méd.*, 1910, No. 41). In some cases of aortic regurgitation rhythmic movements can be observed in the tongue and usually also in the entire base of the mouth. They are synchronous with the pulse and vary in intensity with the degree of hypertrophy of the left ventricle. They have not been observed in other cardiac affections.

It seems clear that Minervini's pulsating tongue is of the same nature as the systolic contraction of the pupils, the systolic nodding of the head, the capillary pulse, and other similar manifestations characteristic of insufficiency of the aortic valves.

A NEW SYMPTOM IN ACUTE OTITIS MEDIA.—Blum (*Mediz. Klinik.*, 1910, No. 42). Blum has observed that, in acute otitis media, pressure behind the angle of the jaw causes more or less severe pain referred to the depression between the jaw and the anterior edge of the sterno-cleido-mastoid muscle. He believes this symptom to be almost pathognomonic.

THE TREATMENT OF HEMOPHILIA.—Krauss (*Muench. med. Wochenschr.*, 1910, No. 46). It has long been known that the injection of a foreign proteid increases the coagulability of the blood. For man we have such a foreign proteid always at hand in diphtheria antitoxin, which should therefore theoretically be of service in hemophilia. In two cases of intractable hemorrhage in two brothers, both bleeders, Krauss saw prompt cessation of the hemorrhage following the injection of one or two cubic centimetres of diphtheria antitoxin. Since the therapeutic action depends merely upon the horse-serum, the antitoxic content of the serum is of no importance in this connection.

CORRESPONDENCE

PARIS LETTER.

TUBERCULIN THERAPY.

By AUGUSTE A. HOUSQUAINS, M. D.

At the Eleventh French Congress of Medicine the matter of the treatment of tuberculosis by means of serotherapy was discussed. The interesting communications which were read at this Congress showed that though this question is far from being settled, excellent results have been attained. Progress along these lines has been slow because of the complexity of the subject and the numerous difficulties which had to be overcome; but despite these drawbacks, the researches have been prosecuted with so remarkable a perseverance that we must realize that we have in hand a therapy that is both efficacious and well-regulated. Hence it is interesting to examine the method and the means by which the investigators arrived at this form of treatment.

It is important at first to differentiate between tuberculin therapy and antituberculous serotherapy. The former is, according to Castaigne, a toxitherapy; it resembles vaccination and immunizes the organism in a different manner than does serotherapy. Serotherapy introduces in a direct manner into the organism a serum which contains antitoxins that are already formed. These antitoxins come from an animal in which one has developed by vaccination an active immunity against the disease which one wishes to treat. Tuberculin therapy, on the other hand, compels the organism to fabricate directly the immunizing principles; hence this sort of therapy is an active vaccination. This method is excellent, but it demands on the part of the organism an effort to which the organism is not always equal. Moreover, it is not always without danger, for not only does it stimulate the processes of immunization, but it has a tendency to provoke a reaction in pre-existing organic lesions which may result in their cicatrization. Toxins are injected into patients already infected; hence it is necessary to be careful that a small dose of poison injected does not aggravate the condition and that the organism is in a state to produce the necessary antibodies.

These are the principles of the method. Practically, the treatment of pulmonary tuberculosis by tuberculin has for its basis frequently repeated injections of doses which are progressively strengthened by a preparation containing a small or a large number of the toxins of tubercle bacilli. Of these toxins some are soluble (exobacillary toxins), others are fixed (endobacillary toxins), while others still are at the same time endo- and exobacillary. For this sort of method to be efficacious and at the same

time inoffensive it is easy to understand that it is necessary to have a very exact notion of the dose and of the technique that should be employed.

In the first place, tuberculin therapy is not applicable in all cases of tuberculosis. Useful in some, it is dangerous in others. Hence it is necessary to use judgment in choosing the cases to which this method should be applied. On the surface of tuberculous lesions the treatment causes a reaction, which is as rapid as a cure by cicatrization, though the lung is but slightly capable of limiting the accompanying congestion. In the organism, in general, tuberculin stimulates the processes of immunization, but it is necessary that the tissues be, as was stated before, in a condition to produce antibodies. We should remember that we are dealing in these cases with cells already saturated with poison and therefore hypersensitive. Gouraud has formulated this matter in terms which should be remembered by all of us: The tuberculin treatment should be rejected in all cases where the tuberculosis is in a state of evolution,—that is, in acute or subacute tuberculosis or in chronic tuberculosis which has become acute. Fever constitutes a good criterion, since we ought to limit the use of tuberculin to conditions which are apyretic or almost apyretic. In the latter case, the pulmonary lesions should be left almost in a state of repose and the general condition should not be too greatly disturbed. Excessive emaciation, marked depression, and cachexia constitute counter-indications. Finally, very nervous patients, hysterics, epileptics, and patients with heart disease stand this treatment very badly. On the other hand, the gravity of the lesions is not a contraindication, even hemoptysis does not constitute a reason to lessen the treatment or cease it altogether.

Among the patients having no contraindications, those who are susceptible to the greatest benefits from this method are the following: (1) Those in whom, after having been benefited by a hygienic and dietary treatment, the progress of the disease is arrested and the lesions remain indefinitely stationary; (2) those in whom an apparent cure has taken place, but where the general condition is precarious; and (3) those patients in whom the disease has developed slowly and where the hygienic treatment was not followed, or in those who, on account of professional exigencies, are exposed to complications and to relapses.

The tuberculin preparations which are employed in therapeutics are very numerous. Their value, however, is about equal. The principal preparations are those of Koch (old tuberculin T. A. K.), Denys's tuberculin in filtered bouillon, Béranek's tuberculin, Landmann's tuberculol and Spengler's I. K. (Immun Koerper). It would be impossible to enumerate all the formulas which have been proposed.

The technique is not complicated. What is necessary is to resort to the habitual precaution of a very rigorous antisepsis. The point of the needle of the syringe is pushed into the subcutaneous cellular tissue in the arm, in the thigh, or in the flank. The injection is slightly painful. The thing to remember in following this method is that the doses should in the beginning be infinitesimal and afterwards be increased very slowly, so that the patient shall not be disturbed by any reaction. The injections are made twice a week; little by little the solutions are strengthened, and when this is done they should be given only once a week or once in two weeks. Moreover, the course of treatment should be subordinated to the manner in which the patient tolerates the medicine. This can be easily ascertained by studying the local and general reactions.

At the point of injection, one will notice a slight redness with some tumefaction and considerable sensitiveness on pressure in the evening or during the next day. Occasionally there is produced a pseudo-phlegmonous induration which at times develops into an urticaria. The general reactions are of much more importance. The study of the thermic curve is necessary, since even the slightest rise in temperature should be looked upon as a reaction. The pulse reacts only rarely. There are such disturbances as anorexia, gastric troubles, vomiting; and finally, depression with headache, somnolence, or nervousness with insomnia. Only very rarely is there a reaction around the pulmonary deposits. When this occurs the cough and the expectoration increase, and there may be signs of a slight congestion. These reactions are often an obstacle to progress in the matter of a cure.

When is it necessary to stop treatment? As regards certain patients the reply to this question is simple, and may be formulated as follows:—The symptoms disappearing, one is justified in saying that a cure is at least apparent. But at times there is only a slight amelioration. In the latter case, it is the custom to stop the treatment after the series of increasing doses has reached the stage when the solution is pure tuberculin. At the end of some months, injections may be repeated if the health of the patient is in need of them.

The effort, to which the organism is subjected by the active vaccination which we call tuberculin therapy, ought to be compensated for by a hygienic and dietetic reparation of its physical forces. But the therapeutic adjuvants employed should be selected with care, since all medicines that are contraindicated when tuberculin is administered must be avoided. We should follow Gouraud's advice and treat only patients who can resort to rest. Creosote is contraindicated. The progress towards recovery is shown only after many days; hence, what should not be forgotten is that the treatment must be persisted in for a long time.

Renon states that tuberculin cannot be considered a comprehensive treatment, since it does not contain all the toxins of the Koch bacillus. Nevertheless, it has undoubtedly an efficacious action in all cases in which the symptoms can be clearly outlined.

Although tuberculin therapy is as yet an imperfect method, it has proved its worth in certain cases, and has even been successful where other forms of treatment have failed. Therefore, when it is a matter of treating so grave an affection as pulmonary tuberculosis, is one justified in withholding from a patient the benefits of a treatment, though it may be handicapped by some imperfections?

February 10th.

BOOK REVIEWS.

DISEASES OF THE STOMACH AND INTESTINES. By Robert Coleman Kemp, M. D., Professor of Gastro-intestinal Diseases in the New York School of Clinical Medicine. With 280 illustrations. Some in colors. Philadelphia and London: W. B. Saunders Company. 1910. Cloth, \$6.00.

This work of more than 700 pages is a most satisfactory and complete treatment of the subject. The chapters include among others, the headings of Anatomy and physiology of the stomach and intestines, history taking, methods of *x-ray* examinations, local treatment of the stomach, nervous affections of the stomach, the stomach functions in diseases of other organs, typhoid fever, diverticulitis, and intestinal parasites.

The chapter on visceral displacements has been very fully treated. Movable kidney as one of the stigmata of gastropptosis is present in approximately 95 per cent. of the author's cases. The improvement following promiscuous nephropexy in gastro-intestinal and other symptoms can be often imputed to the post-operative rest in bed and to the increase in fat by proper feeding. Associating with gastropptosis are changes in the position of the duodenum productive of stasis which readily accounts for gall-bladder symptoms simulating stones so often attributed to nephropptosis. The author warns against the frequent mistake of confusing gastropptosis with dilatation of the stomach. The peculiar conformation of the abdomen, the separation of the recti, movable kidney, and the determination that the lower border of the stomach is abnormally low are sufficiently diagnostic of gastropptosis. Three chief principles are involved in the treatment of the condition. 1. The support and strengthening of the abdominal muscles, thereby increasing the intra-abdominal pressure. 2. Increase of abdominal pressure through the accumulation of abdominal fat. 3. Correction of the gastro-intestinal disturbances and toning up the nervous system.

The author gives a detailed description of various forms of abdominal supports and corsets. More detail as to the dietetic management of these cases would not have been amiss here.

The subject of protoscopy and sigmoidoscopy is dismissed with illustrations of several instruments and a few words on technique.

The subject of diverticulitis and peridiverticulitis, which has only recently focused attention on the left iliac fossa, is given a careful and satisfying exposition, and should do much to bring this little known subject to the attention of the practitioner.

The book is profusely illustrated with well-chosen cuts, most of which are original. There are numerous reference-citations, and the whole book shows a painstaking preparation to the end of producing a useful and complete textbook.

THE RELIGIO-MEDICAL MASQUERADE—A COMPLETE EXPOSURE OF CHRISTIAN SCIENCE. By Frederick W. Peabody, LL.B., of the Boston Bar. Boston: The Hancock Press. Price, \$1.00.

Mr. Peabody's book, written with the information gained by a first-hand study of Mrs. Eddy's personality and methods, must be received as authoritative. To those who read the investigation and report in *McClure's Magazine*, there is nothing essentially new, except the vitriolic style which Mr. Peabody's indignation impels him to adopt and which he feels is more than justified.

It is doubtful, however, whether books of this class much affect the situation. They are read only by those who are already confirmed in their judgment, and add little to the strength of their opinions,—of course, no "Christian Scientist" will even stop to examine Mr. Peabody's book. In fact, according to history, pseudo-religious movements die out more quickly the less attention is

paid to them, since the seeds are not widely disseminated if the parent weeds are but indifferently attacked.

The almost studied neglect of psychical agencies, on the part of the medical profession, in the matter of cure and comfort for patients, is largely responsible for the growth of such cults as Christian Science. Can it be denied that when the renaissance of medicine and surgery drew the entire attention of the medical fraternity to the operating-room, to the laboratory, in short, to the purely objective study of the phenomena of disease, the emotions, the intricate workings of the mind, were not forgotten? Fortunately, under the leadership of men of the type of Freud, Janet, Prince, and Sidis a better renaissance in medicine is dawning, and when this shall have received full recognition the demand for such unscientific and essentially ignorant applications of psychic curative measures as are Christian Science, et al., will lessen and eventually disappear. Books, no matter how numerous, or how well written, will not stamp out such cults so effectually and completely as when scientific progress lessens the human necessity for their existence.

DISEASES OF THE DIGESTIVE CANAL. By Dr. Paul Cohnheim. Translated by Dudley Fulton, M. D. Philadelphia and London: J. B. Lippincott Co. 1909.

This book has been written with a special consideration of the needs of the general practitioner. Physiological, pathological and anatomical subject-matters have, therefore, been omitted, as also frequent reference to the literature. Much attention is given to the subject of complete and accurate history taking, the author believing quite correctly, that in lieu of special laboratory equipment and a knowledge of laboratory methods, a thorough and rational anamnesis is the most valuable guide to a correct diagnosis. Another valuable and much neglected subject upon which the author lays special stress is the difference between organic and functional or nervous disturbances. A lack of appreciation of this distinction, and especially the inability of the general practitioner to recognize gastro-intestinal disturbances of a purely functional nature is the secret of success of so many "quacks" in treating such disturbances.

Each chapter is followed by several case-reports, illustrative of the subject under discussion, as well as by several prescriptions applicable to the case in point.

The simpler methods of examination of stomach-contents and feces are described. The necessity of giving each patient a written or printed diet list with accurate directions is emphasized, and the appendix of the book contains a few typical diet lists for conditions most frequently met with. The important subject of abdominal binders and supports might with advantage have been treated at somewhat greater length.

The translation is accurate and fluent; a few paragraphs by the translator interspersed through the volume have added to the general value of the work.

APPLIED ANATOMY. The Construction of the Human Body Considered in Relation to its Functions, Diseases, and Injuries. By Gwilym G. Davis. Associate Professor of Applied Anatomy, University of Pennsylvania; M. D., Universities of Pennsylvania and Goettingen; Member of the Royal College of Surgeons, of England; Surgeon to the Episcopal, St. Joseph's, and Orthopedic Hospitals; Orthopedic Surgeon to the Philadelphia General Hospital; Fellow of the American Surgical Association; Member of the Society of Clinical Surgery; Member of the American Orthopedic Association; Fellow of the Philadelphia Academy of Surgery. The Philadelphia College of Physicians, and the American Academy of Medicine, etc. With Six Hundred and Thirty Illustrations, Mostly from Original Dissections and Many in Color. By Erwin F. Faber. Philadelphia and London: J. B. Lippincott Company.

To the reader, who is supposed to be informed with the bare facts of systematic anatomy, especially if he is seeking further enlightenment on the relationship which exists between structure and function and the impairment of this relationship which is caused by disease or injury, this volume of Dr. Davis will prove itself to be of absorbing interest. The author says in his preface that it is not the object of the book to teach plain anatomy, but that the work

is intended to be explanatory and utilitarian in character. It is meant to point out the application of general anatomical knowledge to the conditions met in everyday practice, and it does this in such a way as to remove the old idea that the study of anatomy is uninteresting and dry. The author of this review has passed many pleasant hours in reading the book, and his attitude toward the book has become one of deep admiration. The correlation of facts and the arrangement of the text are such that it puts into one's hands the most valuable treatise from a surgical standpoint, and it may be said that the work is particularly surgical in its attitude. Take, for instance, the excellent chapter on the shoulder-girdle; here the skeleton and the muscles are as well described, then the surface anatomy is considered. Following this comes a clear description of the various affections of the shoulder-girdle put in such a way that the reader gains a most complete knowledge of the various forms of shoulder dislocations, clavicular, scapular, and humeral fractures, affections of the bursæ, tendons, and nerves; and withal a particularly clear description of the objects and ends of surgical treatment. Other parts are handled in the same way. The illustrations are of the highest character. On the whole it may be said to be a most excellent work in all its characteristics.

FRACTURES AND THEIR TREATMENT. By J. Hogarth Pringle, M. B. (Ed.), F. R. C. S. (Eng.). New York: Oxford University Press. 1910. Price, \$5.50.

This volume, which is well printed and illustrated by many original drawings, photographs, and *x*-rays, represents an attempt, on the author's part, to produce a book in English, which would be abreast of the times in the treatment of fractures. The *x*-ray and the result of insurance of workingmen against injuries have brought about much increase of interest in the subject of fractures. Pringle presents, within as short a compass as possible, an account of the mechanisms by which the various fractures are produced and of certain methods of treating these injuries. The work is not encyclopedic, but describes only his own experience; and on this account it has considerable value, since, similar to most English textbooks, it is concisely written. The portion of the book which is new and of striking interest is the chapter which deals with fractures and their results in connection with workingmen's compensation. The question of how far the workingman's earning capacity may have been affected by an accident, he believes to be a problem for a medical man to settle. He attempts to unify the opinions held by the medical profession regarding the injuries themselves and their ultimate effect upon those who have been injured, considering the persons injured as working machines. To this end he has drawn information from France and Germany, where well-established rules for compensation after injury are in effect. He has appended a table which shows in percentages the value to the workingman from the standpoint of compensation of practically all fracture-injuries. This attempt is a most interesting and valuable one, and the book in consequence will have a distinct use in England and, perhaps, in this country in estimating the amount of damage entailed by fracture and allied injuries.

THE SURGERY OF CHILDHOOD. Including Orthopedic Surgery. By De Forest Willard, A. M., M. D. (Univ. of Pa.), Ph.D., Professor of Orthopedic Surgery, University of Pennsylvania; Surgeon to the Presbyterian Hospital; Surgeon-in-Chief, Widener Industrial School for Crippled Children; Ex-President American Surgical Association, American Orthopedic Association, Philadelphia Academy of Surgery, Philadelphia County Medical Society; Ex-Chairman Surgical Section American Medical Association; Fellow Philadelphia College of Physicians, etc. With 712 Illustrations—including 17 in Colors. Philadelphia: J. B. Lippincott Company. Price, \$7.00.

The principal object of this book seems to be the encouragement of earlier examination and recognition of the diseases of childhood. It was, of course, difficult to condense into a single volume all that this implies, but the author has given us what he has found to prove worthy in his own daily experience. The subjects are classified by arranging them in groups of allied conditions and by using the regions of the body as a guide. All extended histories and statistical information have been avoided, for it was apparently Dr. Willard's belief that unless statistics are compiled from the reports of many observers they are unreliable. He has laid special stress upon the importance of the

practical clinical examination of each patient. The chapter on the *x*-ray is a very valuable one. He clearly shows that in addition to all the research and investigation that a surgeon of the present day is called upon to make, there is also required of him considerable accurate cerebration in order clearly to interpret the meaning of the mass of aids which he now has at his disposal.

DISEASE OF THE PANCREAS—ITS CAUSE AND NATURE. By Eugene L. Opie, M. D., Professor of Pathology, Washington University, St. Louis, Mo.; Formerly Member of the Rockefeller Institute for Medical Research, and Pathologist to the Presbyterian Hospital, New York City. Second Edition Rewritten. Illustrated. Philadelphia: J. P. Lippincott Company. 1910.

It is now seven years since the first edition of Opie's book appeared, representing at the time a pioneer work on this subject. Consequently the recent and abundant investigations on the pancreas during this interim have made a very careful rewriting of this edition necessary. The literature has been most carefully reviewed and this with the data collected has served to clear up many obscure points in the previous edition. The chapters on hemorrhagic necrosis of the pancreas, chronic pancreatitis, and the pancreatic pathology of diabetes mellitus have received a most thorough consideration. The pathology of the pancreas has been much simplified, while the symptomatology still remains very obscure. The illustrations are in great part original and the literature references have been brought up to date.

The book represents a most careful and thorough work on the part of the writer, both from the standpoint of originality and that of classification of the observations of others. This makes it possible for anyone interested to have a complete and classified knowledge of the diseases of the pancreas.

NEPHROCOLOPTOSIS. By H. W. Longyear, M. D., Professor of Gynecology and Abdominal Surgery, Detroit Post-Graduate Medical School; Clinical Professor of Gynecology, Detroit College of Medicine, etc. With 88 Special Illustrations and a Colored Frontispiece. St. Louis: C. V. Mosby Company. 1910. Price, \$3.00.

The author contends that the displaced colon is etiologically very important in all cases of ptosis of the kidney and viscera. He has described a broad band that connects the kidney to the colon, which is found extending behind the colon and inside Gerota's capsule. This nephrocolic ligament is considered of sufficient tensile strength when bunched together to support the kidney and colon. In operating to fix these structures the lumbar incision is used, but the kidney is not stripped of the fatty capsule. Instead, the fingers are passed in the first instance beyond the lower pole of the kidney, and are looped about this fasciculus, which is called the nephrocolic ligament. The kidney is replaced in the normal position by pressure from the front, and the ligament is brought up through the loin and sutured just beneath the muscles, a silver wire suture acting as a guy. Attention is paid to the proper feeding and regulation of the bowel. The most reliance is placed in liquid petrolatum as a lubricant, and enemata are employed to induce peristalsis. He reports the histories of 56 operated cases with a large proportion of anatomic cures and many cases entirely relieved of symptoms.

URGENT SURGERY. By Felix Lejars. Translated from the Sixth French Edition by William S. Dickie, F. R. C. S. With 20 Full-Page Plates and 994 Illustrations of which 602 are drawn by Dr. E. Daleine and A. Leuba, and 217 are from Original Photographs. Vol. II. The Genito-Urinary Organs—The Rectum and Anus—The Strangulated Hernias—The Extremities. New York: William Wood & Company. 1910. Price, \$7.00.

This work covers the field that is the province of the surgeon in an active hospital service where cases have to be dealt with without delay. The method of presenting the subject concerns the treatment more than the etiology, except when that is determinative of the surgical procedure. The work is most interesting, both in its method of handling the subject and in the wealth of material which is used illustrative of the various subjects. If one were to follow the chief of a large surgical clinic in the wards and operating-room one would rarely have such an opportunity to learn as by reading this excellent work. The style is excellent and to the point, and the really clever observations hold one's interest and direct the attention along the proper lines.

OPHTHALMIC SURGERY. A Treatise on Surgical Operations Pertaining to the Eye and Its Appendages, with Chapters on Para-Operative Technique and Management of Instruments. By Charles H. Beard, M. D., Surgeon to the Illinois Charitable Eye and Ear Infirmary; Oculist to the Passavant Memorial Hospital, Chicago; Ex-President of the Chicago Ophthalmological Society; Member of the American Ophthalmological Society, Etc. With 9 Plates, Showing 100 Instruments and 300 Other Illustrations. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$5.00.

Taking into consideration the great number of textbooks and treatises on diseases of the eye that have overweighted our book-shelves in the past decade, one naturally wonders why no one has attempted to supply the need of a treatise on ophthalmic operations. This is the more surprising when we consider that no separate work on the surgery of the eye has appeared in the United States in the last half century.

The time is ripe, then, for someone to "break the ice" and that someone has happened to be Dr. Charles H. Beard, Surgeon to the Illinois Charitable Eye and Ear Infirmary. Fortified by an excellent preliminary training under such noted exponents of ophthalmic surgery as Agnew and Knapp, Dr. Beard entered upon his long service at the Illinois Institution, imbued with high ideals and equipped with a well-developed technique. In writing the book Dr. Beard has aimed to "supply a work that would embody not only what experience has taught and judgment prompted as being the more valued measures of all countries, but in particular, those of our own country." Each chapter is preceded by a brief historical note showing how present-day procedures were gradually evolved out of the experience of the past. As is natural (and desirable) those procedures which have been tried and found "not wanting" by the author are discussed in greatest detail, although others come in for due consideration. We note with some surprise that the excellent operation of Ewing (modified Green) for entropion, is conspicuous by its absence. It is extraordinary that this measure, so much simpler than some of the radical procedures described, and equally, if not more efficient, should find no place in a work of this nature.

The writer's style is really delightful, vivid, easy and often abounding in humor. One feels that Dr. Beard writes *con amore*.

The illustrations are copious and are largely the work of Beard himself; but in dispraise, where so much praise has been bestowed, it is necessary to state that the book is marred by many evidences of hasty proof-reading.

AN INTERNATIONAL SYSTEM OF OPHTHALMIC PRACTICE. Edited by Walter M. Pyle, A. M., M. D. Therapeutics. By Dr. A. Darier, Paris. Translated by Sydney Stephenson, M. B., F. R. C. S., London. Illustrated. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$4.00.

This volume is the first of a series of seven, designed to provide a compact resumé of modern ophthalmic practice.

The first part deals, in fourteen chapters, with General Therapeutics. Special Therapeutics, constituting the second part, is considered in ten chapters.

Chapter I. "Methods of Diagnosis," considers, in addition to usual clinical methods, certain laboratory methods, such as sero-diagnosis, the various tuberculin reactions, experimental diagnosis, etc. The chapters following deal with constitutional treatment, extra-oral medication, leading up to a discussion of special local and general therapeutic methods.

Each chapter of the second part deals with special diseases of the eye or adnexa and the application of local and general therapeutic measures.

We have only to recall the international reputation in ophthalmic therapeutics of the distinguished author, to anticipate an exhaustive and original treatment of the subject, and in this we are not disappointed. Dr. Stephenson has done the French into facile English, and Dr. Pyle has exercised careful editorial oversight, not hesitating to rearrange and adapt in the interest of clearness and system.

If this volume be a sample of those to come, it is certain that the complete set will form a valuable addition to the literature of ophthalmology.

ATLAS OF EXTERNAL DISEASES OF THE EYE FOR PHYSICIANS AND STUDENTS. By Dr. Richard Greeff, Professor of Ophthalmology in the University of

Berlin and Chief of the Royal Ophthalmic Clinic in the Charité Hospital. Only Authorized English Translation, by P. W. Shedd, M. D., New York. With 84 Illustrations in Color from Wax Models Printed on 54 Plates with Explanatory Text. The Illustrations are from Models in the Pathoplastic Institute in Berlin. Art Director: F. Kolbow. New York: Rebman Company.

The American edition of Prof. Greeff's atlas of external diseases of the eye is a fine example of intelligent coöperation of author, translator, artist and wax modeler in the production of a series of wonderfully beautiful colored plates. Generally speaking, the pictures are remarkably true to life, both as to drawing and coloration. We must except, however, Fig. 48, Plate XXXIII., which is supposed to represent a case of interstitial keratitis. Here, while the drawing is reasonably good, the coloring is far from representing a typical example of this malady.

REFRACTION AND MOTILITY OF THE EYE. By Ellice M. Alger, M. D., Adjunct Professor of Diseases of the Eye in the New York Post-Graduate Medical School and Hospital; Ophthalmologist to the New York Dispensary, etc. Thoroughly Illustrated with 122 half-tone and other engravings. Handy 12mo. size. 376 pages. Philadelphia: F. A. Davis Company. Price, \$1.50.

We have nothing but words of praise for Dr. Alger's splendid little work. He has produced a book which is clear, sufficiently full without being overladen, and eminently practical. He has steered a most fortuitous course between the Scylla of the "invariable cycloplegist" and the Charybdis of the "never cycloplegist"; and calmly, with much judicial poise, presents the claims of either camp.

The specialist, as well as the general practitioner, for whom the work is principally intended, will acquire a clearer conception of some of the problems of this difficult art from a careful perusal of the work.

LESSONS ON THE EYE: FOR THE USE OF UNDERGRADUATE STUDENTS. By Frank L. Henderson, M. D., Ophthalmic Surgeon to St. Mary's Infirmary, etc. Fourth Edition, Revised. Philadelphia: P. Blakiston's Son & Co. 1910.

These "Lessons" are designed to obviate in part the necessity for didactic lectures in ophthalmology to undergraduate students; the time thus saved being more profitably devoted, in Dr. Henderson's opinion, to quizzing.

In this (fourth) edition the original plan to discuss briefly anatomy, physiology and diseases, while touching very lightly upon optics and errors of refraction, has been adhered to. If we agree with the writer that simple refraction and the use of the ophthalmoscope are less important than the subjects discussed, it must be confessed that the little book is a highly useful one and doubtless has fulfilled a useful function. To-day, however, the tendency is to instruct the undergraduate in the elements of refraction and the use of the ophthalmoscope, in order that he may, if he so desire, add the practice of simple refraction to his abilities in the line of general practice. A number of State Boards of Health now require a knowledge of simple refraction in all candidates for license to practise, and it is fair to assume that this requirement will become general.

DIE INTERLOBAERE EXUDATIVE PLEURITIS (unter Zugrundelegung von 100 Krankheitsfaellen). Von Prof. Dr. G. L. Sacconaghi. Wuerzburger Abhandlungen aus dem Gesamtgebiet der praktischen Medizin. X. Band, 7 Heft. Wuerzburg: Curt. Kabitzsch (A. Stuber's Verlag). 1910. Price, M. 0.85.

Of all pulmonary affections, the interlobar pleuritic effusions are probably most frequently overlooked. Its diagnosis, while easy with the assistance of the *x*-rays, is by no means a simple matter by means of the ordinary methods of physical diagnosis. An interesting point is the frequency with which an interlobar empyema undergoes spontaneous evacuation and cure by means of perforation into a bronchus. This is so common an occurrence that the author advises waiting a reasonable time for it to supervene before proceeding to operative evacuation. An interesting summary of cases from personal observation and the literature closes the monograph.

PRACTICAL BACTERIOLOGY, BLOOD WORK AND ANIMAL PARASITOLOGY—Including Bacteriological Keys, Zoological Tables and Explanatory Clinical Notes. By E. R. Stitt, A. B., Ph.G., M. D. Surgeon U. S. Navy; Associate Professor of Medical Zoology; Philippine Medical School. Second Edition, Revised and Enlarged with 91 Illustrations. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$1.50.

Within the compass of less than 350 pages and rather large print, the author has included not only the entire field of clinical pathology, but a zoological treatise on human animal parasites. This involves an enormous amount of compression and exaggerated brevity. For an army surgeon on field duty, who is unable to carry with him any more than a single textbook that can be slipped into the pocket, such a volume may be indispensable. For one who has access to larger and more complete manuals, its value must remain problematical.

STATE BOARD EXAMINATION QUESTIONS AND ANSWERS—Of Forty-one States and Two Canadian Provinces. A Practical Work, Giving Authentic Questions and Authoritative Answers that will Prove Helpful in Passing State Board Examinations. Reprinted from the Medical Record. Third Edition. Revised and Greatly Enlarged. New York: Wm. Wood & Company. 1910. Price, \$3.00.

The scope of this book is explained by the title. The various examination questions propounded by the various State Boards are arranged by States and under these by subjects. It has no value except as an aid to cramming for a State Board examination, but for this purpose may well prove indispensable.

OSTEOLOGY AND SYNDESMOLOGY. By Howard A. Sutton, A. B., M. D. Assistant in the Department of Anatomy of the University of Pennsylvania; Lecturer in Anatomy, Pennsylvania Orthopedic Institute; Assistant Surgeon, Methodist Episcopal Hospital, etc., and Cecil K. Drinker, B. S. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$1.50.

This little volume has no reason for existence. The only excuse the authors have to offer for publishing it is that they hope to remove the need of tedious labor in studying the bones and joints. There are no illustrations and its only possible value would be that of a quiz-compend.

FEVER-NURSING—Designed for the Use of Professional and Other Nurses, and Especially as a Textbook for Nurses in Training. By J. C. Wilson, A. M., M. D., Author of "A Treatise on the Continued Fevers" and "A Handbook of Medical Diagnosis." Sixth Edition, Revised and Enlarged. Philadelphia: J. B. Lippincott Company.

This little book embodies the substance of a course of lectures on fever-nursing delivered by the author before the student-nurses at the Philadelphia Hospital. In simple and untechnical terms, the reader is taught not only how fever patients are to be cared for, but why. It is not only suitable for nurses but may profitably be put in the hands of anyone who has occasion to care for a member of her family, ill of a febrile affection.

DIE AKUTE CHIRURGISCHE INFECTIOENSKRANKHEITEN. Von Dr. Wilhelm Hagen. Wuerzburger Abhandlungen aus dem Gesamtgebiet der praktischen Medizin. Wuerzburg: Curt Kabitzsch (A. Stuber's Verlag). 1910. Price, M. 0.85.

A brief but systematic review of the acute infectious diseases in so far as they have a surgical interest. The writer takes up in order the various tissues and organs of the body and discusses, from a surgical standpoint, the various inflammatory affections to which they are subject.

THE PHYSICIAN'S VISITING LIST (Lindsay and Blakiston's) for 1911. Sixtieth Year of Its Publication. Philadelphia: P. Blakiston's Son & Co. Price, \$1.25.

A convenient visiting list for those physicians who like to carry their day-book about with them. Tables of incompatibilities, doses, weights and measures and the like, as well as condensed information concerning poisonings and other emergencies, add to its value.

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DIAGNOSIS AND TREATMENT OF DISEASES OF WOMEN. By Harry Sturgeon Crossen, M. D. Second Edition, Revised and Enlarged. With Seven Hundred and Forty-Four Engravings. St. Louis: C. V. Mosby Company. 1910.

THE TREATMENT OF DISEASE—A MANUAL OF PRACTICAL MEDICINE. By Reynold Webb Wilcox, M. A., M. D., LL.D. Third Edition, Thoroughly Revised and Enlarged. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$7.50.

GYNECOLOGIE OPERATOIRE, par Henry Hartmann, Professeur de Médecine opératoire à la Faculté de Médecine. Avec 422 figures dans le texte dont 80 en couleur. 500 pages. Paris: G. Steinheil. 1911. Price, 18 Fr.

LESSONS ON THE EYE FOR THE USE OF UNDERGRADUATE STUDENTS. By Frank L. Henderson, M. D. Ophthalmic Surgeon to St. Mary's Infirmary. Fourth Edition, Revised. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$1.50.

ALLGEMEINE MIKROBIOLOGIE. Die Lehre vom Stoff und Kraftwechsel der Kleinwesen. Fuer Aerzte und Naturforscher dargestellt von Dr. med. Walther Kruse, Professor und Direktor des hygienischen Instituts an der Universitaet Koenigsberg i.Pr. Leipzig, Verlag von F. C. W. Vogel. 1910. Preis: 30 Mk.

PUERPERAL INFECTION. By Arnold W. W. Lea, M. D., B. S. (Lond.), B.Sc. (Manch.), F. R. C. S. (Eng.), Lecturer in Obstetrics and Gynecology, the University, Manchester Surgeon, Northern Hospital for Women Assistant Surgeon, St. Mary's Hospital, Manchester University Scholar and Gold Medalist in Obstetric Medicine. New York: Oxford University Press. 1910. Price, \$9.00.

CLINICAL PATHOLOGY IN PRACTICE—WITH A SHORT ACCOUNT OF VACCINE-THERAPY. By Thomas J. Horder, B.Sc., M. D., F. R. C. P., Medical Director and Demonstrator of Morbid Anatomy (Late Demonstrator of Pathology and Junior Demonstrator of Practical Medicine at St. Bartholomew's Hospital), Physician to the Great Northern Hospital and to the Cancer Hospital, London. New York: Oxford University Press. 1910. Price, \$3.00.

INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene, and Other Topics of Interest to Students and Practitioners. By leading members of the Medical Profession throughout the world. Edited by Henry W. Cattell, A. M., M. D., Philadelphia, U. S. A. Volume IV. Twentieth series. 1910. Philadelphia and London: J. B. Lippincott Company. 1910.

PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries, Improvements in the Medical and Surgical Sciences, Edited by Hobart Amory Hare, M. D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia, assisted by Leighton F. Appleman, M. D., Instructor in Therapeutics, Jefferson Medical College. December 1, 1910. Lea & Febiger, Philadelphia and New York. Six dollars per annum. Volume IV. Contents: Diseases of the Digestive Tract, etc., by R. S. Lavenson; Diseases of the Kidneys, by H. R. Bradford; Surgery of the Extremities, Shock, Anesthesia, etc., by J. C. Bloodgood; Genito-Urinary Diseases, by W. L. Belfield, and Practical Therapeutic Referendum, by H. R. M. Landis.

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EDITORIAL.

MR. BERNARD SHAW'S "PREFACE ON DOCTORS."

Just why the medical profession should be more sensitive to criticism than any other profession has always been an enigma to a goodly number of its intelligent members; and though they have sought for the reasons with commendable powers of observation, and quite sedulously, they are really as much in the dark to-day as when they first prosecuted their investigations. One would think that the life which the general practitioner leads would make him look things squarely in the face and regard all the barbed shafts of criticism as expressions of ignorance, and as such to be dismissed at once with scant notice. But such is not the case, and more's the pity, for whenever a critic arises to make mention of his shortcomings there is invariably an exhibition of temper on his part, that does not bespeak complete confidence in himself or the possession of manners which are worthy of imitation. Now in the case of Mr. Bernard Shaw, whose criticism on doctors* is at present being read with considerable avidity, ignorance cannot be made the specific charge, nor can it be said in all fairness that a quota of the truths he wishes to drive home are tinged with exaggeration. We may say that some of his statements are fantastic and smack too much of his elfin propensity to upset our most cherished and conventional manner of thought; but even admitting this, there are enough statements in his essay that need not necessarily make us squirm and go red in the face on account of their verity and trenchancy, but must—and now we are taking the intelligence of numbers of medical men for granted—bring home to us the thought that perhaps a jolt such as this will be productive

*The Doctor's Dilemma, Getting Married, and the Shewing-Up of Blanco Posnet. By Bernard Shaw. New York: Brentano's. 1911.

of an introspection on our part that will make us aware that our foibles are not so few and far between but that they may be seen by a critic even less acute than Mr. Bernard Shaw.

The attacks to which we are accustomed are the sort which are so virulent or so stupid that they breathe all those prejudices that are most illuminating in indicating to us, in no reserved terms, that the science of medicine is a very traduced science when filtered through the usual lay mind. Who has not read the serio-comic strictures which the literary (?) monthlies publish in the hope of attracting readers ever on the alert for sensations? Who has not been bored to distraction reading about the multifarious diets which restore to perfect health those afflicted with all sorts and conditions of disease? Whether it is Upton Sinclair, who believes in the starvation system, or some other oaf who has a theory for the restoration of health, despite the onset of a disease that medical science knows to be incurable, there is the same monotony in all the outpourings. But beside the monotony there is the dangerous note: the panacea that promises to all who shall obey the various crotchets, a complete annihilation of all the discomforts which may arise from a grave disorder; and when inconveniences are placed in abeyance is not the disease itself vanquished? Such credulity, we imagine, would arouse Mr. Shaw's scorn and move him to Gargantuan laughter, for is not one of his dicta the very sane one: "Do not try to live for ever. You will not succeed"?

Now Mr. Shaw has no sovereign remedy to offer other than the one which is at our very doors, but which the public in its ignorance has thrust aside as less effective than huge bottles of medicine. Of course, in certain rare moments in the life of the ordinary individual, there is a partial realization that soap, fresh air and sunshine must have a bearing on health; but this thought is fleeting and its dissipation is complete directly the conversation turns on a cure effected by some doctor in circumstances that are not extraordinary to the medical mind, but are quite out of the common to the uninitiated layman. And it is just account of the credulity of the public in matters such as these that Mr. Shaw waxes indignant, and his quarrel is not only with the doctors, who do not discourage this puerile talk, but with the public itself for its high regard for the ordinary in medicine and its disregard of the tenets of private and public hygiene. As a champion of preventive medicine—and even those physicians who are ever on the alert to increase the number of their patients, so that they shall be objects of envy to the lesser medical fry are enthusiasts as regards this matter—Mr. Shaw leaves nothing to be desired, and by his advocacy of a sanity that cannot be questioned places himself in the front rank of our medical philosophers,

who know what fresh air and soap stand for in the matter of preventable diseases.

If we disagree with what this keen observer says about vivisection and vaccination, we must not forget that he, as a literary man of socialistic tendencies, and one, moreover, who has a whimsicality that cannot refrain from thrusting pin-pricks into all laws that interfere with personal liberty—he even attributes souls to animals like another St. Francis or St. Anthony—is militantly against coercion in any form whatever. This is a point of view that can never be ours, for we were brought up to believe otherwise; but even so, what so thorough a critic as Mr. Shaw says should not go unheeded. And this is written not because the writer of these lines is carried away by any one point which the essayist advances, but because it is always well to know how certain phases of our medical advancement impress a thinker of originality.

It is an altogether different matter when Mr. Shaw expatiates on poor doctors, rich doctors, "fashionable diseases," and last but not least, those nurses who gossip so delightfully to their patients against all the doctors in the community, save the doctor who happens to be in charge of the case. Here he is on his own ground as critic and philosopher. He knows how poorly some members of the profession are paid and what a struggle it is for them to eke out an existence, and his solution is that the State should intervene and convert them into Medical Officers for their own sake and for the good of the community; for, as he puts it, "nothing is more dangerous than a poor doctor," meaning that he must live and that on account of the fearful struggle his judgment in the sick-room may not always be the best. He knows the avarice of some of our "prominent men" and something of their charges, even though he does not mention how at present they are reaping a harvest from Professor Ehrlich's discovery by demanding the most exorbitant fees. He knows the "fashionable diseases" which have been the butt of many a witticism, and for which he blames the public more than the doctors—a public that insists upon being heroes and heroines of the operating table. And he knows how a trained nurse advertises the one doctor who employs her and disparages the other doctors who have not favored her. But despite his unlimited survey of these matters, he is no enemy of the medical profession, but a critic whose penetration is the sort that unfolds before us certain foibles which we have somehow overlooked or been ashamed to acknowledge as positive weaknesses. Juxtaposed with the articles of no depth or literary character which flood our reviews and are only too often written by medical men who are aspiring after laurels in the literary world, this essay of Mr. Shaw's has all the superior claims which come from mentality, undauntedness, and an unusual amount of wit.

FEMALE EDUCATION.

The effects of college life on girls seem destined for a rigid investigation on account of the frequency of the charge that though it makes most of them more fit to struggle for existence, individually, as celibates, it really unfits them for the team work of the larger and more natural family life of maternity. Man's education is very largely, if not exclusively, designed to increase his efficiency as the head of a family, struggling for its existence with the aid of woman. The greatest social good is, of course, the ultimate aim and will come as a matter of selection; but in discussing the methods most likely to survive, we must remember that society is composed of families, not individuals, and the proper family life is our goal. Physicians must take a larger part in these investigations of the pedagogues, for the question of physical and nervous fitness is the paramount factor after all. The marriage- and birth-rates of the *alumnæ* are, therefore, of vital importance, for though we must confess that some of these women are of types not worth perpetuating, yet as a class they should produce a more intellectual generation than girls too stupid to accept education. It is charged and denied that too few *alumnæ* marry, and too late at that, and even these produce too few offspring. We are soon to receive more accurate information, but in its interpretation we must not forget that a woman, who raises two of her three infants, is doing better social work than she who raises only two of her eight or ten, and this irrespective of the possibly higher intellectuality of the former two, who receive better nourishment and care as a rule—and the cost is far less for the result. There are hosts of women, by the way, who assert that the divinely imposed task of replenishing the earth has been completed, and that an average family of two surviving children is all that God now demands. Those who persist in raising large families are only preventing the marriage or reproduction of others, if the average number of children cannot be more than three. In this view of the case the *alumnæ* may size up better than the rabbit-like lower types.

The physique of college girls, therefore, seems to be of more importance than that of boys, and we, as a profession, are virtually interested in the repeated charge that too many of the female students are injured by poor food and excessive indoor confinement in rooms badly ventilated and otherwise unsanitary. Making due allowance for exaggerations and even baseless assertions, there must be some truth in the charges or they would have been refuted long ago. There must be room for improvement at least. At the same time, conditions cannot be so very

bad, if the *alumnæ* are able to raise such a high percentage of their offspring as we are so often told they do. The physique cannot be bad to do that, even if it is so frail that three pregnancies are the limit of endurance. What is the use of twenty conceptions, if eighteen of the products are to die before maturity, mostly in the first year of extra-uterine life? It really seems that the female physique is getting frailer in civilization, making a reduced birth-rate necessary. If the colleges turn out women strong enough, we need not try to make them stronger. The point to prove, is whether they are not made weaker.


The character of female education may seem foreign to our sphere of sanitation, yet it has a close relation to the physique. Co-education now seems doomed, from the overwhelming proofs that the rates of mental development of boys and girls are so different, and the mental characters also, that the two sexes cannot possibly keep pace without one lagging and keeping back the other, or being unduly strained to keep up. Girls naturally surpass the boys and yet are dreadfully strained in some ways in the competition. The curriculum in the female college should, therefore, not be patterned after that of male schools, and we notice as a fact that the trend is now toward domestic economy in the former with a view of making the *alumnæ* better partners in a life team, not necessarily wage-workers. Nevertheless, the woman who is born with more brains than necessary for a human cow, must not be starved intellectually. Her higher life is of great importance and is entitled to consideration in education—not to be made masculine, but for sheer enjoyment of living. Should such training reduce her procurative powers, no special harm is done. It is now quite generally accepted that the social organism is evolved to preserve the families in existence, and the families are not bound to provide material for the future, which looks out for what then exists. The old idea, of doing something for one's country, is a survival of the time when boys were needed to sacrifice in war to preserve the family and nation. To make fine mothers may be a big part of the aim of college life, but it is not all by a long shot; nor should it be, for Sparta tried it, but Spartans in time became noted for stupidity, and sank into nothingness by the side of more intellectual neighbors, who did not try such absurd eugenics.

DR. WARREN B. OUTTEN: AN APPRECIATION.

By the death of Dr. Warren B. Outten, the medical profession of St. Louis has lost a member of sterling worth. The sanity of his outlook, the soundness of his judgment, the clarity of his thought, stood him

in good stead in all those complications of life which fall to the lot of the physician who enjoys a large practice. These are qualities the possession of which is an asset greatly to be desired; but in Dr. Outten, they were ballasted by yet another attribute—namely, an unquenchable desire to work unremittingly, so that the ideal he seemed always to have in view could be better and better realized. And during our long acquaintance with him this was the lesson we culled from his endeavors, and a very good lesson it was, for it taught us that mental sobriety in all its manifold workings is sure of results, whereas vagaries and crotchets are certain of failure.

To review the life of Dr. Outten, in all its details, would require greater space than could possibly be obtained in a page of this JOURNAL, and would moreover be a twice-told tale, as the important points have been dwelt upon in nearly all the obituary articles which have appeared in the lay and medical press. But what concerns us here more than his positions in the Humboldt Medical College, the St. Louis Medical College and the St. Louis College of Pharmacy; his executive ability in organizing the St. Louis Hospital of the Missouri Pacific Railroad and other railroad hospitals; is the fact that from 1899 to 1901 he was editor of the INTERSTATE MEDICAL JOURNAL. In this capacity he acquitted himself as only one of his mental attitude and intellectual attributes could, and whether it was a matter of judgment that was required or the careful and painstaking editing of the various papers that fall to an editor's lot, there was always present the critical mind that is unafraid of candor.



OPINION AND CRITICISM.

ACAPNIA AND SHOCK.

The preliminary rumble of an earthquake in our conception of medical and surgical shock is now being heard. To most of us the shock of to-day is the shock of Crile, described over ten years ago as a state of vasomotor failure. Yet recent studies tend to show that in shock there is not only a failure of the vasomotor centre, but even perhaps heightened activity. The work of Porter and Quinby, of Seeley and Lyon in this country, of Malcolm in England, seems to have settled this point. But until the present no definite explanation of the fall of blood-pressure which is invariably associated with severe shock has been offered, until Henderson of Yale brought forward his "Acapnia" theory (acapnia meaning diminished carbon dioxide in the blood). The splendid evidence gathered about this theory seems almost to have solved the problem.

It is practically agreed among physiologists that the stimulation of the respiratory centre depends upon carbon dioxide alone, oxygen playing a passive part. If one takes several deep breaths, the cessation of respiration following is due purely to temporary diminution of carbon dioxide or acapnia. Henderson showed that excessive artificial respiration was followed by symptoms identical with surgical shock; rapid pulse, fall in blood-pressure, and other manifestations of shock were present, and blood-gas analyses proved that the oxygen was unchanged, whereas carbon dioxide was greatly diminished. Further, when he reduced the carbon dioxide in the blood by opening the abdomen and exposing the viscera to a current of absolutely non-irritating warm moist air, the arterial carbon dioxide was sufficiently diminished to produce all the symptoms of shock. In all these experiments the inhalation of carbon dioxide succeeded in resuscitating the animals. If the carbon dioxide content of the blood is reduced so markedly as to be insufficient to stimulate the respiratory centre, the cessation of respiration may be so long as to cause death,—that is, if it lasts eight minutes. Vigorous artificial respiration in dogs for thirty-five minutes produced fatal respiratory failure. The same result was obtained by making the animals produce their own acapnia by means of vigorous respirations following stimulation of the sciatic nerves.

The clinical bearing of these researches seems to be as practical as it is fascinating. It is not altogether rare to see respiratory failure follow

a long period of excruciating pain associated with excessive panting respiration, while the heart may beat for a short time. In this case the condition is the same as in vigorous artificial respiration in dogs. Henderson also applies his theory very prettily to anesthetics. For instance, if the state of acapnia is produced by severe pain there is not sufficient carbon dioxide in the blood to stimulate the respiratory centre which is kept going by the afferent impulses. The exhibition of morphia or of some other anesthetic cuts off these afferent impulses, and respiration ceases. This may explain many deaths on the table. If the drug had been given in the beginning before the development of acapnia, the fatal result might not have followed. The importance of the failure of respiration in shock is shown by the experiments of Crile, who expounded the doctrine of vasomotor exhaustion, for most of his animals died of cessation of breathing before the heart stopped beating.

Henderson's theory applies also to those animals in which the heart stops before respiration fails. His researches show that the heart is absolutely dependent upon the supply of venous blood, and that when this fails the heart cannot supply enough fluid to the vessels, and consequently blood-pressure falls. Acapnia causes this venous failure both by lowering venous pressure directly and causing changed osmotic conditions in the venous circulation. As a result, fluid exudes from the veins into the tissues, the supply of venous blood to the heart diminishes, and blood-pressure falls. During this stage inhalations of carbon dioxide and intravenous infusions of a saturated solution of carbon dioxide are of value. Soon, however, the gradual decreasing amount of blood causes the development of venous asphyxia; acidosis, and acute diminution of the amount of circulating blood; and, finally, the heart fails for lack of something to work upon.

This theory can be extended clinically to all cases of excessive respiration following severe pain, and it may apply to cases of shock following laparotomies with extensive loss of carbon dioxide from the abdomen. Whether there is a purely medical application remains to be seen. In acute infections there are frequently changed osmotic conditions and water retention; in pneumonia, there is in addition excessive respiration and in fatal cases a condition much like surgical shock.

THE WASSERMANN REACTION IN THE MATTER OF PATERNITY.

To medical investigators of an inquiring nature, it has always been an alluring subject to ascertain the paternity of children, though it has never been explained whether this was done for the sake of tracing hereditary traits or for further knowledge in the matter of in-

herited diseases. But, all the same, the subject has been on the *tapis* for many a year, even before eugenics was promulgated and the excuse could be made that the betterment of the human race depended on the physical fitness of the father and the state of his morals. Especially has this matter been of interest where illegitimate children have proved their right to live by reason of mental gifts far above the ordinary, and which could be explained only—unless they were thought to be *lusus naturæ*—on the ground that their progenitors were of such mental endowment that this attribute completely overshadowed the inferior mentality of their plebeian mothers. Fortunately for these students of the untoward in nature, a new era has begun which should hearten them in the possible realization of their wishes in regard to the paternity of children, especially if these bear the stigma of syphilis.

At a recent meeting of the Medical Society of Vienna, Dr. Hochsinger reported the case of two infants, aged three weeks and three months, respectively, who had yielded a positive Wassermann and had unmistakable signs of congenital syphilis. The parents, upon being questioned, stoutly denied ever having had syphilis, and upon the Wassermann test being made it proved to be negative. Nothing daunted, and evidently an investigator who was bent upon finding out who the fathers of the children were, Dr. Hochsinger plied the women with questions until they confessed the truth. The two inamoratos were found and Dr. Hochsinger's endeavors were rewarded, as both men gave a positive Wassermann reaction.

Thus can be plainly seen that a new chapter in socio-medical science has been written, that may lead to all the light required in the investigation of the real paternity of a child that is the unhealthy offspring of healthy parents. Of course, for the medical investigator who is more interested in the workings of the Wassermann reaction than the preservation of the marital bond, an undertaking such as we have described is fraught with interest; but, while this cannot be denied, is this sort of research justifiable, even though the test might entrap the culprit? The child's symptoms indicated the character of the disease beyond a doubt; but was the diagnosis made a whit more certain by the test applied to its real father? Assuredly not.

Taking a scientific means for ascertaining a disease out of its proper environment, and transplanting it to a domain to which it does not belong, is a very mischievous performance, indeed. It is mischievous for more reasons than need be dwelt upon here; but one objection must be mentioned, and that is its manifold applicability directly its power for detection becomes known to the laity. In fact, as a result of what has already been written on syphilis in the lay press in the last few months, the minds of only too many readers are already beset with the idea that few, if any, of the people they meet are free from the disease. Hence, are we wrong in stating that with the added knowledge of the Wasser-

mann reaction, which, by the way, has not as yet been exploited in the press, the time is not far distant when doctors will be pleaded with by suspicious husbands to make the test in the hope that the illegitimacy of their children and the unfaithfulness of their wives may be proved.

LITERARY NOTE.

A very interesting and fascinating book, indeed, is Dr. Charles J. Whitby's "Makers of Man," which has recently been published by the Rebman Company (New York). The forty men, who are discussed from many points of view, divulge to us, the lesser men of the world, that in them are all those qualities we see about us daily, though, of course, so sublimated that the superficial observer is not aware of this fact. What Dr. Whitby does in his book is to mow down all those trimmings with which criticism has hitherto garnished its definition of genius by making it something so abnormal, so elusive, that it passed the understanding of man. To effect his candid exposé of the matter, the author shows in detail the physical and mental characteristics of the types under discussion, as well as the natural history of purpose and the value of individuality which shape them for their life's work. This is not the higher criticism, so much sought after, both by medical and lay readers, but the sort of writing that is explanatory of much that is completely lost under the avalanche of technicalities with which the perpetrators of the former succeed in beguiling their readers into the thought that only what is involved and startling should be read and carefully weighed. The simplicity and logic of the book cannot be too highly praised, though on second thought, there is something else that should receive the greatest meed of laudation—to wit, the absence of all thought that abnormal sexuality must be present in the majority of men of genius, otherwise their lives and works cannot be satisfactorily explained, at least not by a medical writer.

ORIGINAL ARTICLES.

THE TREATMENT OF MALARIA.

By FRANK SHERMAN MEARA, Ph. D., M. D., of New York,
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From the barks of the various species of cinchona is derived an alkaloid, called quinine, and this quinine is more truly a specific than any other drug in the whole pharmacopeia.

The treatment of malaria resolves itself pretty much into the skilful use of quinine; hence, the motif of this paper is its use.

The rôle of the mosquito, the anopheles, the varieties of the lowly order of animal life, the sporozoa, the stereotyped clinical manifestations of chill, fever and sweat and the intermittent or remittent temperatures in malarial infection are familiar to us all.

While we are interested in the differentiation of the manifestations of the disease, into the tertian, quartan or estivo-autumnal forms, as based on the variety of the invading organism, the degrees of severity after all depend rather on where the infection occurs than on what organism is present. In the Northern States we have to treat relatively mild cases; in the South much more severe and some pernicious types; and in the tropics many pernicious cases.

Considering first the milder cases as seen here in the North, some of them are so slight that the patient may object to going to bed. The ordinary attack, however, compels the patient to seek rest.

In any case our results are better when the patient does go to bed and is made to observe rest.

Rest.—The difference between the appearance of the shaking, fevered or sweating patient of one day and the apparently well individual of the next, is one of the most striking contrasts of medicine.

During the period of intermission, the patient feels so well that he will often rebel against remaining in bed and greets his physician sitting up and dressed on the occasion of his next visit.

In the milder cases, no strenuous objection to this performance need be voiced; but, if the paroxysm has been severe, the patient should be

assured that his remaining at rest facilitates success in aborting the second. In the remittent estivo-autumnal forms it should, of course, be insisted upon. Each individual paroxysm means an intoxication, and as the result of this and the marked pyrexia accompanying it, tissue destruction has been entailed which makes all the more imperative the economy in the body's energies accomplished by rest of the tissues attacked by the organism. The one tissue in which a gross lesion occurs, is the red blood-cell and its destruction induces a degree of anemia. Now, in untreated cases or badly treated cases, emaciation and anemia of a marked grade ensue and the necessity for rest is as urgent as in other infections of long continuance. With prompt treatment this does not obtain, and after an anticipated paroxysm fails to appear the patient may be allowed to get up.

Bed.—On account of the brevity of the attack, when well treated, one may be less insistent on the nicety of details with reference to the bed than in the infectious diseases of longer continuance, if it entails extra expense in the procuring; but in severe cases, in pernicious types with continued fever, we economize the strength both of the patient and attendant and enhance the success of our treatment if an iron half-bed with woven wire-springs and firm mattress, which is best illustrated by the hospital bed, is used.

Room.—If the patient is still in a malarious district his room should be so chosen that the chances of further infection are lessened. By selecting one in the upper part of the house, since the invasion by the mosquito is less likely, and making doubly sure by the use of screens or mosquito netting, this object is accomplished. This, too, affords a certain protection to attendants.

In other respects the room should be chosen in severe cases according to the same criteria that obtain in other acute infections, with a view to size, ventilation, light, access to the open air by veranda and nearness of bath-room, simplicity of furnishings and remoteness from disturbing elements of the household.

Diet.—The suddenness of the attack, the anorexia, nausea and vomiting contraindicate any effort at nourishment during the paroxysm. During the afebrile periods of the intermittent type of fever, semi-solid or solid food of a simple character may be taken, but at any meal occurring within six hours of the anticipated recurrence of the paroxysm the food should be fluid or semi-solid, as milk, eggs, cereals or toast. This is in consequence of the vomiting that may ensue.

If the fever is of the remittent type, the same precautions should be observed at the periods of the paroxysm, but in the intervals the diet, while it should be somewhat restricted in the choice of food, should nevertheless contain sufficient nutritive value in terms of calories and proteid; some 2,500 to 3,000 calories and 70 to 100 grams of proteid.

Symptomatic Treatment During the Paroxysm.—The three stages of the paroxysm are each provided with their own particular form of discomfort for the patient and demand pretty constant attention and ministration to mitigate their evils.

Beginning with chilly sensations, followed by shiverings and then shakings, with the skin covered with "goose-flesh," pale, cyanotic, the face pinched and the teeth chattering, the patient can only complain of the cold and beg for warmth.

One does everything possible to afford this, by putting hot-water bottles to the feet, wrapping flannel about the extremities, heaping on blanket after blanket and giving hot drinks, hot water, weak tea, hot weak milk, into which a dash of ginger may be stirred, hot lemonade, a little hot whisky or brandy.

One other feature of this stage often requires interference—namely, vomiting.

If there is much useless retching, a draught of warm water may help to effect an evacuation of the stomach; then simple measures to stop further vomiting may be pursued, as sipping of effervescent drinks or putting a mustard paste on the epigastrium.

If the retching cannot otherwise be overcome, administer morphine hypodermically, in doses of gr. $\frac{1}{12}$ or gr. $\frac{1}{8}$.

In the old and feeble, symptoms of collapse may threaten during the chill. These are to be met by hot drinks of coffee, brandy or whisky, or a teaspoonful of aromatic spirits of ammonia in water; or a little strong water of ammonia may be inhaled from a towel or handkerchief held a little way from the nose.

This stage lasts from a quarter of an hour in light cases to two hours in very severe ones; and then come occasional flushings of heat and gradually there is established the febrile stage.

Fever.—In a few minutes the patient is "burning up with fever," complaining as bitterly of the heat as he was of the cold shortly before. The face is flushed, the whole skin red, the pulse bounding.

The hot-water bottles are removed, blanket after blanket comes off, until only a sheet remains; bits of cracked ice are sucked, cold water or cold lemonade is sipped, cool sponge baths given or sponges of water containing alcohol. A light rub with the hand, using 25 per cent. alcohol in water, affords much comfort.

Headache is the feature of this stage as vomiting is that of the chill, though occurring also in the first stage. This is relieved by cold cloths, wrung out of ice-water and applied to the brow. The cold sponging mentioned lessens the intensity of the headache. If, however, it is intense and not lessened by the measures advised and, especially, if delirium accompanies it, morphine in small doses hypodermically, gr. $\frac{1}{24}$ to gr. $\frac{1}{12}$ may be given. Coal-tars should not be used.

This stage lasts usually from four to six hours and then as the fever

declines, perspiration appears on the face and forehead and the third stage of sweating is ushered in.

Soon the whole body is covered with a drenching sweat and, except for the discomfort of the sweating, the patient grows rapidly better. Relief is afforded the patient in this stage by rubbing the body with dry towels and changing the linen. He may be allowed drinks of water or lemonade freely.

If symptoms of collapse intervene, as but rarely occurs, hot drinks and stimulation as advised during the cold stage should be given. Sleep usually follows this stage.

Such are the events and their treatment in the milder cases of tertian and quartan fevers of this latitude.

Of the estivo-autumnal fevers of the North, it may be said that they are more severe than the other types, but very rarely pernicious. The nervous symptoms and the aching pains of the limbs and back are more striking and the paroxysm is much longer, usually over twenty-four hours and often permitting but a few hours of intermission or remission.

Specific Treatment.—As I have said quinine is looked upon as more truly a specific than any other drug in use, and yet its specificity is due to effects not confined to the plasmodium malariae alone, but common to all protoplasm.

In general it is a protoplasmic poison. At first and in slight doses, this action on protoplasm is expressed by an enhancement of function, that is, stimulation; but this in turn, in sufficient dosage, is followed by depression of function, paralysis of same and death. That this action varies in degree in different stages of cell-growth and cell-activity is also true and upon this fact depends its usefulness as a drug.

Now, the protoplasm of the malarial organism seems peculiarly susceptible to it, but by no means equally so at all stages of its development. It is so much more susceptible to quinine than the body-cells, that amounts that will kill the plasmodium have no deleterious effects on the latter.

It is during the stage when development and nutrition are most active, that is in the young stage of the parasite, that quinine is most operative. This fact has a practical bearing on the administration of the drug.

Time of Administration.—Many rules are given by numbers of physicians with reference to the time of administration, and by some of them with an insistence on exactness that would seem to attribute more of the success to this item in technique than to the drug itself. Facts about the absorption and excretion of quinine are as follows: Within thirty minutes evidences of it are found in the urine. In six hours half of it is eliminated, but after that the elimination is more tardy and traces of it can still be found in the urine after seventy-two hours.

Sporulation—the setting free of the young parasites in the bloodstream—occurs at the time of the chill. We should theoretically get the best results by a large dose given three or four hours before the

anticipated chill, at a time when the maximum amount of quinine would be in the circulation to act upon the organisms during their egress from the red blood-cells. We may, then, a few hours before the paroxysm give our maximum dose. It goes without saying that this will in no way abort the coming chill, as the organisms responsible for that are protected in the red blood-cells; but it will destroy their offspring and abort the chill for which they would be responsible forty-eight or seventy-two hours later.

Again, as others advise, the quinine may be administered during the decline of the fever. The fever we believe to be coincident with the setting free of the parasite in the blood. The young organisms very quickly attach themselves to the red cells which they seek to penetrate.

If quinine is given at this time, its rapid absorption, as just expressed, brings it into contact with them and effects their destruction.

Still others advise dividing the daily dose, administering a portion, three times a day, every four hours or every six hours. As we have seen, only half the dose ingested is excreted in six hours, so this procedure keeps the blood cinchonized continuously. This method has advantages where the time of the paroxysm is more difficult to determine, as in the remittent or continuous forms, in quotidian infection and in the pernicious types.

So one may administer the dose (1) a few hours before an expected paroxysm; (2) at the decline of the fever of a paroxysm; or (3) divide the dose throughout the twenty-four hours.

The object is to have enough quinine in the blood to kill the organism when it is free.

Preparations.—There are numerous salts of this alkaloid, representing varying weights of the alkaloid and varying solubility. Most of the salts are sparingly soluble; a few freely. Of these the sulphate (basic) which contains about 75 per cent. of the alkaloid (74.31 per cent.) is the one most commonly used when the drug is administered by the mouth. The more soluble acid hydrochlorate, or bisulphate, or bimuriate of quinine and urea is used for hypodermic purposes.

The sulphate is practically insoluble in water (1 in 800), and is usually administered in capsules or wafers. Pills and tablets are likely to be hard or tough and in this way the drug escapes absorption. The 2 grain quinine capsule is the favorite unit. There is no question that this drug were better given in solution and, indeed, where the condition of the stomach leads to a suspicion of its impairment and hydrochloric acid may not be secreted, the solution should be used. The drug is freely soluble in any dilute acid, hydrochloric, sulphuric, phosphoric or tartaric. A minim per grain is enough. The objection to this method is the intensely bitter taste. Effort may be made to disguise it. One way is to dissolve the dose in a few grains of citric acid (gr. x.), in a little lemon juice, add to it water in which a pinch of bicarbonate of soda has been dissolved and take while effervescing.

Dosage.—In the tertian or quartan fever of a non-pernicious type, the daily dose to begin with should be gr. xv. to gr. xx. In the estivo-autumnal form gr. xxx.

Mode of Administration.—In the first mentioned forms I prefer to give, if seen before the paroxysm, gr. xv. of the sulphate; if seen during the decline of the fever, the same dose. From that time on giving gr. xx. divided into four doses in the twenty-four hours (the dose at the decline of the fever forming a part of it), until the succeeding paroxysm is aborted, then diminishing the dose gr. ii. every two days until the dose is reduced to gr. vi. a day for three or four weeks.

In the estivo-autumnal forms give the larger dose gr. xxx. to begin with, and after aborting the paroxysms, reduce to gr. xx. or gr. xvii. and proceed in the same way as above.

Pernicious Infections.—As I have said the pernicious type of the disease is rarely seen in the North; in the South and in the tropics, however, it is much more common. It may be caused by the tertian, quartan or estivo-autumnal forms of the parasite, but much more commonly by the last.

The fever is usually irregularly remittent or constant.

The profound intoxications are seen more commonly in those who have had repeated attacks or in neglected cases, and in those in whom resistance has been lowered from one cause or another.

Profound depression of all the vital centres is seen, and a particular imposition of the poison on one or the other organ gives a stamp to the picture and affords abundant cause for error in diagnosis.

Thus we have a comatose form in which sudden loss of consciousness resembles apoplexy; apathetic conditions with icterus, like yellow fever; diarrheas that resemble cholera or dysentery; and not infrequently an attack characterized by profound prostration, collapse, excessive sweating, sometimes subnormal temperature, the algid form.

In these cases quinine must be used hypodermically or intravenously according to the urgency.

The best salt for hypodermic use is the acid hydrochlorate, which dissolves in less than its own weight in water. Make up a solution as follows:—

Hydrochlorate of quinine.....	5 grm.
Distilled water.....	10 c. cm.

• Use 15 minims as a dose, which will contain gr. $7\frac{1}{2}$.

The amount needed in the twenty-four hours is some 24 grains given in divided doses in this way.

In these severe but less urgent forms, if given by the mouth, the amount should run up to 30 or 40 grains a day.

One should take every precaution to be assured of a sterile needle, syringe and skin, and should inject into the gluteal region or muscles of

the back and go down deep into the muscle. There is likely to be some pain and induration. Another preparation of quinine which is excellent for hypodermic use and freely soluble is the bimuriate of quinine and urea, to be used in the same dose.

In most urgent cases, it may be deemed advisable to put the drug into a vein. This may be done in physiological salt solution. For example:—

Hydrochlorate of quinine.....	1	gram.
Sodium chloride.	0.075	gram.
Water.....	10.	c. cm.

Inject all at once into the basilic vein made prominent by a ligature above. Other veins, if more accessible, may be chosen.

A word more about quinine before we proceed with our subject. This drug is an antipyretic and used as such under certain circumstances. Its antipyretic action is apparently due to the depression of function of protoplasm, of which mention has been made. Some effect, too, upon ferment action can be determined. The result is a lessened output of heat from the tissues, through direct action and not through the intermediation of the heat regulating nervous mechanism. It must be remembered, however, that in malaria the control of temperature is to be attributed entirely to the destruction of the plasmodium and not at all to this pharmacological action.

Of more importance to us are those toxic symptoms that may occur when inordinate doses of the drug are given, and so can be avoided; and which occur after very small doses in certain people, whose reaction to the drug constitute an abnormality which we call an idiosyncrasy, and cannot be avoided. Idiosyncrasy is one of those philological accomplishments, sent as an advance agent to occupy a territory until knowledge shall advance. It is the shadow rather than the substance of a thing, but like many other shadows in affairs temporal it is allowed to usurp and continue to rule as the real thing. It is derived from two Greek words, *idios*, own, and *synopsis*, mixture,—having its own mixture, that is a quality peculiar to the individual. What that quality is and how it operates is left for the future to elucidate.

These toxic symptoms are called “cinchonism.”

The earliest and most common are ringing or roaring in the ears and a mild degree of deafness. If it amounts to no more than this we give it no consideration, but this may go on to complete deafness.

This has been attributed to congestion and hemorrhages in the tympanum, but Cushny believes, in the light of recent research, that this view is not correct, but that the phenomena are attributable to degenerative changes occurring in the spiral ganglion in the cochlea.

Less frequently than the hearing, the vision is affected. The field of vision is contracted, the color vision disturbed, and blindness may ensue.

The visible changes in the eye are contraction and even obliteration of the retinal vessels, sometimes degenerative changes in the retinal nerve-cells and even atrophy of the optic nerve.

Skin eruptions occur in great variety. The most common is an erythema that has been mistaken for scarlatina, an illusion heightened by the fact that it may desquamate; next to that, urticarial wheals. Hemorrhagic rashes also occur, which on occasion may give rise to the diagnosis of a septic process. Less commonly, the drug may cause gastric discomfort of a marked degree and is believed at times to cause hemorrhage from the kidneys. In a case of malaria this may give rise to the diagnosis of black water fever and, indeed, Koch maintains that black water fever is due to quinine. I think that the better judgment attributes hematuria to quinine but very rarely, but believes that it is certainly indicated in black water fever.

When idiosyncrasies do exist to a marked degree they constitute contraindications to the use of the drug.

A further contraindication is any inflammatory process in the middle ear or labyrinth.

In the pernicious form indications must be met as they arise. For collapse, stimulation with strychnine or caffeine is required, and in the more urgent cases more rapidly acting agents should be used, such as camphor, adrenalin or ammonia inhalations.

In the algid form the body heat must be maintained by hot drinks containing coffee, brandy or whisky; by blankets and hot bottles or bricks about the body and the hot-water bag at the feet; and by hot rectal injections containing coffee.

In the choleraic form the same line of treatment with hypodermoclysis or venous infusion of warm salt solution.

Morphine is to be injected to control the peristalsis.

For extreme nervousness morphine is the best, because the least depressing and most effectual of the sedatives.

After the severe infections there are certain sequelæ that are possibilities that must be taken into consideration.

The first of these are the mental disturbances, delusional insanity, mania and most common of all melancholia.

Sharp watch must be kept of these exhausted subjects to appreciate any mental aberration, any depression presaging melancholia, with its self-destructive impulses.

Kidney complications occur. Albuminuria is frequent during the attacks, in some 30 per cent. of the tertian and quartan, and 50 per cent. of the estivo-autumnal. This must not be taken too seriously, as real nephritis rarely ensues in the milder forms of the disease. Taking the estivo-autumnal form and the severe infections it induces in the tropics, nephritis, as a sequel, will amount to nearly 3 per cent. and is usually of the chronic parenchymatous variety.

These conditions are to be treated in the same way as if arising from any other cause.

Large liver and large spleen may persist without symptoms of any kind attributable to any interference with their functions.

Anemia, as the result of the blood destruction, is an inevitable result of malaria. After the tertian and quartan infections, the repair of the blood is rapid; after the estivo-autumnal form less so. Good food, air, change of surroundings, iron and arsenic all help recovery.

There are, however, cases in which repeated attacks have occurred, where the treatment has been neglected or been insufficient, and where a chronic poisoning is set up that is termed malarial cachexia. These patients show but few organisms in the blood. These are usually the estivo-autumnal form, and are not easy of demonstration. The patients are markedly anemic, with the type of secondary anemia; are emaciated, nervous and constantly fatigued, and have a poor appetite and readily get short of breath. Next to the anemia the enormous size of the spleen is the most notable clinical manifestation.

These cases should be removed from the malarious district in which they reside, to one free from infection: to the mountains or to a suitable seashore resort. If this cannot be done, attempts must be made to protect the patient from further infection, that is, the bites of mosquitoes, by choosing an upper room, screening the room, and taking special care to avoid exposure toward nightfall.

Quinine should be begun at once. Doses of gr. iv. may be given three times a day, or in more severe cases up to gr. xvi or gr. xx a day until the slight afternoon rise of temperature that usually accompanies the infection subsides. Then the dose of gr. iv three times a day may be cut down to gr. iii. and gr. ii. three times a day and continued in these doses for weeks.

Iron and arsenic are of great help in these cases to improve the blood state.

Iron may be given in the shape of a carbonate of iron or other iron preparation. I prefer the carbonate, *e. g.*, pillula ferri carbonatis (Blaud's) gr. v., one three times a day.

Arsenic may be given as Fowler's solution, liquor potassi arsenitis, m. iii., three times a day, increasing m. i. each day up to m. viii. or x. three times a day or to the point of some manifestation of intolerance, as suffusion of the eyes, puffiness under the eyes or gastric disturbance.

Iron and arsenic may be combined in pill form, *e. g.*:

℞ Massæ ferri carbonatis (Vallet's mass) 10.00 grm.
Acidi arsenosi. 0.05 grm.

Massa fiat in pilulos numero xxx. dividenda. S. one three times a day.

This gives us gr. v. of the mass of carbonate of iron and gr. 1/40 of the arsenious acid at a dose.

The nervous manifestations may be helped by strychnine in doses of gr. 1/40 to gr. 1/30 three times a day, taken with the iron and arsenic; and, indeed, they may all be incorporated in one pill or capsule. One should always know that the pills ordered are fresh.

Plenty of fresh air and sunshine are even more important than drugs. Good food and plenty of it to make good the extensive tissue destruction; cool baths, showers, light massage and exercise; at first by walking, later, as the patient's strength returns, by golfing and horse-back riding, and at the shore by swimming complete the treatment.

What is to be done if the patient cannot take quinine?

I hesitate to offer any substitute because there is no other that is even remotely comparable to quinine and the "cannot" is often a prejudice on the part of the patient, or a result of ignorant usage, as colossal dosage, insoluble pills, and nauseous mixture. Again the little disturbances of hearing are interpreted too seriously and further effort to continue the drug is given up. Idiosyncrasies of serious import are very rare.

It is a detriment both to the physician and patient to convey the idea that anything else is nearly as good, or is a fair substitute.

Mythylene-blue has been advocated as such. It is a very poor substitute. If, however, we are actually debarred from using quinine, then we may try it in doses of gr. viiss. to gr. xv., a day, divided into three or four portions.

One should remember to warn the patient that the drug will lend color to the urine, a rather startling phenomenon to a patient who is not informed, and that strangury or diarrhea, intervening in the course of treatment, may be due to the drug.

Prophylaxis.—We are so well informed now as to the sequence of events in malarial infection, as to the rôle of the mosquito, the individual and the malarial organism, that our prophylaxis is clearly defined in measures aimed at the three links in this chain.

The mosquito like Carthage "delenda est" and medical Catos has arisen to reiterate the slogan.

Mosquitoes breed in marshes, ponds, pools or any receptacle of quiet water, even cisterns, buckets or tin-cans.

Where municipalities have become sufficiently interested or in certain territories under control of the Federal government, vast stretches of marshes have been drained for the extermination of the mosquito or, in smaller areas, water-containing depressions have been filled in.

Where communities are ignorant and careless, brigades of mosquito exterminators have been formed, whose business it is to see that cisterns and water receptacles are screened, that small pools are filled, rubbish-containing water disposed of or a thin layer of kerosene poured on the surface.

Kerosene is the most effectual substance used to exterminate the mosquito over extensive surfaces of water. The larvæ of the mosquito

have to come to the surface of the water to breathe. The oil prevents their access to the air and fills their air-channels.

Education in schools, public lectures, disseminated literature, explaining to individuals how proper methods may be used in their own environment, is one of the prophylactic measures of the highest import, for through this means both personal and civic responsibility is cultivated.

Numerous odorous substances have been used to kill the mosquito in a closed space, the best of these is pyrethrum or pellitory, which contains an acrid resinous-like substance, which when the powder is burned, gives fumes very fatal to them.

If the mosquito cannot be destroyed, the individual may be kept from their attack. This has a double significance. It prevents the man from becoming infected, or being infected, from infecting the mosquito to pass it on to another man.

Isolation may be effected by the use of screens in windows and doors, by choosing a room in the upper stories for a sleeping room. If the individual lives in a badly infected district, he should avoid going out after sunset or before sunrise unless his head is protected by a veil worn over the hat, his hands by gloves and his ankles by boots. In the tropical forests such precautions are necessary even by day.

Applications, such as oil of pennyroyal, oil of eucalyptus, camphor, citronella, may be made to the skin, the odor of which will keep the insects away.

R Oil of pennyroyal.
 Oil of citronella.aa. 1 ounce
 Alcohol up to.8 ounces
 Mix and apply locally.

Going into malarious districts, at the season of the year when infection occurs, or if living in malarious districts, prophylactic doses of quinine should be taken: gr. ii. three times a day or slightly larger doses, gr. vii. to x. two or three times a week.

Finally, as the infection may die out of itself in certain instances, we know that the body has the power of elaborating protective substances, so that it may repel lesser infections and mitigate severe ones. To do this the body must otherwise be in good health and all measures aimed at excellent physical condition should be considered for those living in exposed districts.

Alcohol does harm and it should not be used in the tropics at all. Arctic explorers tell us it should not be used in the North, so, it would seem that the temperate zone would have a hard battle to justify its designation.

Finally, the malarial organism is attacked in the body of the man, by the use of quinine, before it has had time to multiply and give rise to the characteristics of the disease.

THE DIFFERENTIAL DIAGNOSIS AND TREATMENT OF
SOME OF THE COMMON DISEASES OF THE
UPPER ABDOMINAL QUADRANT.

By W. W. GRANT, M. D., of Denver.

It is manifest that not only in private practice, but in the teaching and curriculum of the schools, there is a serious lack of systematic study of disease at the bedside, and appreciation of the great value and importance of clinical instruction, as well as of analysis and rational interpretation of symptoms.

But some schools are waking up to the importance of bedside diagnosis. Let us hope that the early future will demonstrate this growing interest in a most important department of our study and work in this brilliant period of evolution in pathology and bacteriology, and of great surgical accomplishments and commendable progress in neurology. Yet it is true, as regards diagnostic achievement, the growth has been slow and the pace lame and halting in comparison, while the great internists, skilled in diagnosis, few and far between, have had a big field to themselves.

In no department of medicine and surgery, and especially the latter, has such great interest and activity been shown as in the subject under consideration; and in no department are mistaken diagnoses more common. In no department is an early, accurate diagnosis of greater importance. It is the special opportunity of the general practitioner to display both interest and skill, and to render the greatest possible service to the medical art, and substantial contributions to the triumphs of surgery. For I think it will be conceded that in no department is credulous nature more imposed upon, and in none are diagnostic errors and delays more fatal.

We approach this subject, therefore, in the confident belief that it will appeal to the conscience and interest of our profession. I believe the conviction is justified that where one physician makes a painstaking, intelligent examination of a case, though it may not be wholly scientific, but commendable, there will be a dozen who will make an indifferent and careless one, reaching perhaps a prompt diagnosis, and too frequently an erroneous one. We seem not to appreciate important clinical facts in the investigation of disease. In the analysis, meaning and interpretation of symptoms, we do not take our work seriously. Consequently, scientific medicine, in its true and broad sense, is promoted by the few, recognized by the many, and valued less by most than it deserves to be. Careless

methods, false logic and unjustifiable deductions are the too frequent result.

In medical college work, we are moving with commendable spirit and energy to a higher plane of teaching. Weak and unnecessary schools are being eliminated; the better consolidated, thus giving better advantages, and exalting the standard of medical education; and, by so doing, meeting the highest hopes of the profession, and the just demands of public opinion, enlightened by the scientific and humane work of our profession.

Yet the curriculum of the schools is still defective and especially so in all that pertains to preventive medicine and the public health. How *much* is taught about pure foods, pure water, hygiene, sanitation and allied subjects, which effect the individual organisms and anaphylaxis, or susceptibility to disease.

The latter is now believed to have its origin in the intestinal tract. No physician or surgeon can lay any claim to being an accurate diagnostician as to the diseases of the upper abdominal cavity, without an intelligent basic knowledge, not alone of the organs under normal conditions, but also as influenced by diet, drink, occupation, habits, environment, and many other things which influence local as well as general health, and have a distinct influence in the production of immunity, as well as increased susceptibility to disease in a particular organ or part. As it is known that hydrochloric acid is secreted only in a certain part of the stomach, we may the more reasonably interpret the significance of its presence in some stomach cancers, its absence in most, and its increase in ulcer of the stomach. The diseases of the lower abdomen are better understood and treated, while in the upper quadrant both knowledge and treatment are far more empirical.

It is impossible to discuss the important facts and differential diagnosis of diseases of the upper abdomen without allusion to the appendix, for the simple reason that, even now, it bears the burden of almost every doubt cast upon the stomach, the duodenum and the gall-bladder. The voluminous literature, with the still unnecessary mortality, too plainly carries with it the charge of erroneous, late diagnoses and delayed operations. The story runs something after this fashion: The patient complains and gives a history of indigestion. He is, of course, "bilious," and if he has occasional rather severe attacks, lasting a few hours or a day, with or without nausea or vomiting, he may be lucky, or unlucky, if he escapes the charge of "acute indigestion," due to "error in diet"; or with some surgeons and physicians, a mystery of doubt and uncertainty befogs his conclusions, but appendicitis produces such a history, and an immediate interval operation is advised. It is needless to say that the pathological findings may be, and sometimes are, as uncertain and negative as was the clinical history of appendicitis. We may, with propriety, paraphrase the statement of Kelly, as to the disease, "that no patient is killed by an

early operation, but many die for want of one," as a general declaration applicable to many diseases, and especially to those under consideration, that no patient dies from an early diagnosis, but many die for want of one.

Stomach and duodenal ulcers are common diseases, and the proportion of the duodenal to the stomach ulcer is much greater than was believed only a few years ago. Infective cholecystitis is even more common, and its frequent association as a cause of cholelithiasis and chronic or sub-acute pancreatitis, is acknowledged. The causative relation of gall-stones to cancer of the gall-bladder is established, while primary cancer of the liver is uncommon. All these diseased states are attended with marked and persistent symptoms of indigestion. It cannot be too strongly impressed that these symptoms of positive, chronic indigestion have a basis in organic disease, and until we seek and find pathological reasons for the application of drugs and surgical procedures, we cannot hope to make satisfactory progress in the scientific treatment of disease.

In this connection, it is proper to mention the association, or connection of certain disturbances of the female adnexa in creating disturbance of the stomach. A typical and instructive illustration is the following: A maiden lady of thirty-five, a music teacher, for three years has complained of frequent, severe pain of stomach, occasional slight nausea, constant epigastric tenderness. Was told by one physician that she had chronic appendicitis, by another stomach ulcer; and gastro-enterostomy was advised. In a recent examination, I found not the slightest indication or history of appendicitis, no gall-bladder history, and no satisfactory evidence of stomach ulcer. Inquiry elicited the information that menstruation was normal as to frequency and quantity. Three years before she had a fall, and stomach disorder dated from that time. In an examination per vaginum, I found complete retroverted uterus with probable descent of an ovary. Pressure on the uterus per Douglas pouch in lifting it, caused immediate aggravation of the stomach symptoms. Replacement by intraperitoneal shortening of the round ligaments gave complete and prompt relief. These displacements are common, and frequently give not only no local discomfort, as in this case, but no reflex or sympathetic disturbance of distant organs.

Ulcer of the stomach presents certain distinct and rather constant symptoms: pain and tenderness of the epigastrium, hemorrhage by vomiting within an hour or two after eating. The pain is relieved by eating, and the hyperacidity and irritation due to it, by alkalies. The hemorrhage is not, as a rule, severe, but its frequency produces anemia. Severe hemorrhage is not common and does not often occur; but it may occur in acute ulcer, or in the course of chronic ulceration. The severe hemorrhage in acute ulcer comes on without premonition or previous history of indigestion, but is always followed by the latter. Hemorrhage is the first conclusive symptom, or evidence, of gastric ulcer. Only within the last few years has anything been known of duodenal ulceration. The better

it is understood, the more common it is known to be. While it is generally believed that the symptoms and history of gastric ulcer and duodenal ulcer are practically the same, yet they are in fact quite different. Hematemesis in gastric ulcer occurs soon after eating; in duodenal ulcer six or eight hours after eating. Occasionally, when ulcer is very near to pylorus, hematemesis occurs in this form of ulcer. It is less likely to result in cancer and is more amenable to surgical treatment than is ulcer of the stomach.

In reviewing for a Chicago journal the very recent work by Moynihan,* the writer noticed a strong insistence upon a distinct periodicity in the course of duodenal ulcer, a subsidence of all symptoms for several months at a time, and especially a recurrence with cold weather. There is no such periodicity or relation to the seasons in gastric ulcer. The tenderness is much the same in both. The epigastrium is the chief seat. It radiates to the left in gastric ulcer and to the right and under the shoulder blade in the duodenal.

He says there is no foundation for the "venerable fallacy," that dyspeptic symptoms are due to excessive acidity of the gastric juice, and that in all cases of hyperchlorhydria operated on by him he has found always duodenal ulcer, but less free hydrochloric acid after a test-meal.

He makes the very interesting and significant statement that "to-day it can be truthfully claimed that any first class internist or surgeon should be able to make a diagnosis on the clinical symptoms and history alone, without resort to the laboratory for the detection of blood in the feces, or reliance upon physical signs."

Dilatation of the stomach is common in duodenal ulcer, and especially so when stenosis of the pylorus occurs in chronic ulcer. Dilatation is uncommon in gastric ulcer.

Infective cholecystitis is common, and with the inspissated gall-bladder mucus, is the condition which precedes cholelithiasis. Infection is a frequent sequel of typhoid fever, and consequently the Eberth and colon bacilli are the usual bacteria found. Gall-stones do not necessarily produce pain or severe colic. When arrested in the cystic or common duct, the pain is so severe and spasmodic as to leave no doubt as to its source. Obstruction of the cystic duct does not, as a rule, produce jaundice. Obstruction of the common duct, if complete, does. A stone may be fixed in this duct and yet be sufficiently movable to permit the escape of bile. This was demonstrated years ago by the late Christian Fenger. Inflammatory thickening, due to what is called catarrh of the ducts, may produce temporary cholemia or jaundice. The same class of digestive symptoms exists as in duodenal ulcer and in many cases of appendicitis, but a careful study of the natural and clinical history of each case will, as a rule, leave little doubt as to the diagnosis. It should be stated that cholecystitis and appendicitis not infrequently coexist, and

*Duodenal Ulcer. Philadelphia and London: W. B. Saunders Co., 1910.

many errors are related as to the diagnosis in these diseases respectively.

Chronic interstitial pancreatitis is common, and is usually an infective sequel to gall-bladder disease.

As long as the Islands of Langerhans are in healthy action, glycosuria will not result, so urinary examination is necessary in the determination of the questions involved in disease of the pancreas. Fatty diarrhea should also be noted and the Cannidge test applied to urine, though it is not reliable.

Acute hemorrhagic pancreatitis is indicated by severe epigastric pain radiating to the left, vomiting, subnormal temperature, tumor, and symptoms of peritonitis and ileus. It is rapidly fatal without operation, and the diagnosis must be made with little delay, or an exploratory operation made, which usually determines the diagnosis, and saves those who recover. Hypertrophy and sclerosis of the head of the pancreas, due to chronic interstitial inflammation, has not infrequently been mistaken for cancer, but the error was not discovered until drainage of the gall-bladder cured both.

The intimate anatomical and physiological association readily explains the common pathological relation of the gall-bladder, ducts, duodenum and pancreas. The subjects of cholelithiasis seem to be, as a rule, rather fat than lean, rather lymphatic than sanguine. The tissues are rather softer than normal, and even in the absence of jaundice there is a yellowish tinge, or muddy coloring, of the conjunctiva and skin. If there is tenderness, it is beneath the ninth costal arch. Subdiaphragmatic abscess is the result of perforation of a post-cecal appendicitis, of the gall-bladder, or perforation from stomach or duodenal ulcer. The subject should not be concluded without mention of the marked digestive symptoms observed in a certain class of cases that are said to suffer from nervous dyspepsia. These are usually anemic, neurotic women, and it should be needless to assert that gastro-enterostomy is positively harmful in these cases.

The increasing prevalence of cancer is fully recognized. The excessive mortality is an established fact. The stomach is affected more frequently than any other organ. Mayo Robson, Moynihan and W. J. Mayo state that over 70 per cent. of stomach cancers are *preceded* by *evidence* of chronic gastric ulcer. The latter is more common in women; while duodenal ulcer is more frequent in men, not infrequently involving the pylorus. The age of the patient, the history of the ulcer, loss of flesh and absence or great diminution of free hydrochloric acid, and increase of lactic acid evidenced by test meals are strongly suspicious of cancer.

TREATMENT.

The treatment is both medical and surgical. I know of no class of patients with such credulous imaginations, who are such a burden to themselves and who so thoroughly test the patience, the skill and the

ingenuity of the medical attendant as those neurotic individuals who believe they have serious organic disease. They have stomach manifestations; appendectomy and gastro-enterostomy have frequently been performed in such cases; and it is, perhaps, needless to say with disappointing results. Even when organic lesions require it, the beneficent results are generally late in their manifestations. Rest, suitable diet, habits, environment, etc., are especially necessary to their successful and satisfactory treatment.

It is to be hoped that the day of treating *symptoms* is rapidly passing. When in doubt *as to what is the matter*, the treatment, medical or surgical, is purely empirical. When no serious painstaking effort is made to solve the doubt, treatment must continue unsatisfactory as well as unscientific.

The acute stomach ulcer, even though attended with free hematemesis, is best treated medically. Operation is seldom required, for the hemorrhage ceases about as suddenly as it comes on, and does not often recur. Yet, the ulcer is the foundation and beginning of the chronic ulcer which does require operation, preferably by gastro-intestinal anastomosis,—the posterior no-loop operation is the best,—and cures most cases with no operation as to the ulcer itself. Curling's ulcer following burns is acute and more apt than others to perforate and require immediate operation.

In some cases of circumscribed ulcer with hard base, the ulcer should be excised, or the Rodman or Finney operation done. For the sub-acute or chronic ulcer of the stomach and duodenum, these are the measures of choice, in the order mentioned. No modern operation has given better and more lasting results. Its use should be confined to these conditions and to pyloric stenosis.

A gall-bladder, once infected, with or without stones, is always infected, until cured by operation and drainage. The same operation cures the cholemia and pancreatitis which exist in consequence of infection of the gall-bladder.

W. J. Mayo has stated that with an open pylorus, the artificial opening in gastro-enterostomy will eventually close. Moynihan enters a positive denial, and further says that when the stoma does close, the operative technique was defective and the opening too small, necessitating, occasionally, a second operation. With the posterior no-loop operation, the vicious circle does not occur.

In cancer, the operation, of course, is different and more elaborate. The primary operation for duodenal and stomach ulcers is not only curative, but distinctly prophylactic as to cancer, which should emphasize the great importance of a timely, correct diagnosis.

Moynihan is emphatic in condemnation of the too common habit of treating dyspepsia as a disease, instead of as an expression of organic disease. To treat functions instead of organs is not rational. In this con-

nection, the very recent investigations of Crile on the pathological cytology of anemia, surgical shock, infections and Graves's disease are most interesting, and I believe pertinent to the occasion.* It is an accepted doctrine that there is a correlation between clinical phenomena and morphological changes. These demonstrations are now extended to the brain, and Crile shows that even "in shock there are *corresponding degrees of changes* in the *structure* of the *nerve cells* in all parts of the brain." When there is grossly altered function, there is a definite morphological change in the brain-cells. This applies to all organs and functions. There is but one logical conclusion, and that is, there is no such thing as functional disease; that all disease is necessarily organic, and that to treat functional manifestations and symptoms as anything but an *expression* of organic action is irrational and unscientific. It is hardly necessary, I think, to resort to a priori conceptions to show the fallacy of treating dyspepsia, and a host of other symptomatic expressions as disease.

These suggestions are not speculative, but based upon facts which ought to appeal as strongly to the medical mind, as the correlation and conservation of force, or the mechanical equivalent of heat does to the scientist.

My endeavor is to show, if possible, that we have depended too much upon the laboratory, upon instruments of some scientific precision, and too little upon our own faculties, knowledge, and observation of disease to advance the cause and necessity of better diagnostic knowledge on the part of the general profession. We have surrendered our opportunities and individual resources to the genius, or exceptional accomplishments, of a few men, in and out of the laboratory. The result has been a depreciation of the masses, especially in diagnostic skill, both medical and surgical. Erroneous, or delayed, diagnoses are the too common sequelæ, with its unfortunate consequences.

A certain measure of imitation may be pardoned, but at best it is never a constructive force; and for the general tone and knowledge of the profession to advance to a higher plane, it is necessary that there should be greater individual effort and accomplishment in the clinical study of disease.

As an aid in certain necessary conditions, and in the solution of doubtful problems, no well-informed man can doubt the value of the laboratory, since there is no brighter page in the history of modern medicine than that written by bacteriologists and pathologists.

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SOME UNEXPECTED EXPERIENCES IN LOBAR PNEUMONIA.

By CHARLES G. STOCKTON, M. D., of Buffalo.

The pneumococcus is notorious for its ubiquity. It is variable in its morphological characteristics and inconstant in the results which follow its introduction into the organism. We find that it may multiply in the upper air-passages for an indefinite period, apparently without serious results, but occasionally produces a violent reaction in these parts. It may thrive for a long time in the urinary tract, producing no more serious effects than an irritable bladder; on the other hand, it may produce great local and systemic disturbance. A common cause of simple, acute pleurisy, it develops in a proportion of cases local or widespread empyema or abscesses of the lung. It is occasionally found in the fluid of the joints, apparently the cause of acute arthritis. Endocarditis, pericarditis, meningitis and peritonitis are at times the local expression of an infection by pneumococcus. The involvement of the accessory sinuses of the head and inflammation of the mastoid are recognized as being amongst the more common results of infection by this organism.

We are accustomed to consider lobar pneumonia as the expression of a pneumococcus infection of the lungs. When this subject is analyzed, it will appear that lobar pneumonia is something more than a simple pneumococcus infection of the lungs. For instance, many cases of bronchitis depend on a pneumococcus, and broncho-pneumonia that follows a long and irregular course may depend upon the same cause. Very frequently we find that the serous covering of the lung is involved while the parenchyma of the organ escapes. Now, lobar pneumonia is something different from pleurisy, from bronchitis and from broncho-pneumonia, and the question may well arise, why is it that this organism in a proportion of cases displays its activity with a sudden onset, a rapid course, terminating generally in a crisis with very characteristic pulmonic lesions, accompanied by very characteristic systemic disturbances? Most of us will admit that pneumonia in some way or other is dependent upon pneumococcus. But at the same time it must be conceded that the same organism is competent to produce any one of several diseases of the respiratory tract, and each of these several diseases has its peculiar syndrome, which enables us to speak of these several affections as different clinical entities. Furthermore, when we analyze critically our cases of true lobar pneumonia, we find that we are dealing with a disease having very protean tendencies.

It seems to me that a useful subject for discussion would be to in-

introduce a consideration of the numerous peculiarities exhibited by this disease, as one encounters it in ordinary hospital practice.

To begin with, let me cite the following case:—

Case 1.—Typical lobar pneumonia; marked leucopenia without grave depression; rise of blood count with defervescence.

An Italian, twenty-one years old, who had previously enjoyed good health, and who was attacked by pneumonia, with the usual onset three days before entered the Buffalo General Hospital, February 17th, 1910. At this time he was found to have a temperature of 105° F., a pulse of 108, respirations 30. He had the characteristic facial appearance of lobar pneumonia, including herpes, and on physical examination it was discovered that he had consolidation of the lower half of the right lung, with the usual signs. As a routine matter, the blood count was taken when, to our surprise, it was found that the white cells numbered only 2,200. This remarkable leucopenia led us to suspect that the house physician making the blood examination had fallen into error. Therefore, Dr. Karl F. Eschelman (to whom I am indebted for this and other observations described in this paper), counted the blood and found 2,100 white cells. It was a recognized fact that in grave cases of lobar pneumonia, there is an absence of leucocytosis, and, occasionally, as the vitality of the patient falls to a low ebb, we may find a leucopenia, but never in my experience have I seen lobar pneumonia in a patient apparently doing well, on the third day of the disease, with a leucocyte count so low as this. The natural inference was that the patient was suffering from typhoid fever, and that we had a typhoid pneumonia rather than one of pneumococcus infection. A Widal reaction, however, was not present. The patient in other respects, ran an uneventful course and on the fourth day of the disease, his blood count rose to 2,500. On the sixth day it was 4,800, and resolution was beginning. On the eleventh day, resolution was complete and the patient had a white count of 7,700. He made a perfect recovery and was discharged cured.

Possibly some of you have had a similar experience and, should it be so, it would be interesting to learn your interpretation of the blood changes.

Case 2.—Typical lobar pneumonia and convalescence. Three weeks later returned with hyperemia of the lung, fever and serious pharyngitis; abscess, pure pneumococcus culture.

On January 5th, Mrs. K. H., aged twenty-five, entered the hospital with typical lobar pneumonia, which ran an uneventful course in spite of the fact that she suffered from an old mitral valvular disease. She was discharged as well on the 25th, three weeks after entrance. On the 28th, three days subsequently, she returned complaining of pain over her lower left chest, the area formerly involved in pneumonia. There were physical signs of hyperemia of the part, nothing more; the patient had a moderate dyspnea, accompanied by what seemed to be pleuritic

pain. There was a leucocytosis of about 16,000. What most attracted our attention was a violent pharyngitis. The temperature ranged between 103° and 104° F., the pulse was 120, respirations 32; the blood-pressure between 95 and 100. The peritonsillar tissues, posterior to the glands, became edematous, were incised, and there was discharged a bloody serum which contained a pure culture of the pneumococcus. The attack ended by crisis about five days after the beginning of illness, after which there was an uneventful recovery. This case was interesting to me because of the synchronous appearance of congestion in the lung and pleura (which had been involved three weeks before in lobar pneumonia), and the appearance of the unusual pharyngitis which appeared to depend upon the pneumococcus. The question arises, was this a slight recurrence of lobar pneumonia? In this connection it should be noted that the patient had been ten days free from temperature previous to this second illness. What should be the interpretation of the pharyngitis? Is it possible that through the involvement of the throat her immunity was raised so that a relapsing pneumonia was cut short? It is interesting to know that a pharyngitis and tonsillitis may depend upon infection by the pneumococcus.

Case 3.—Pneumonia; acute arthritis; pneumococcus and staphylococcus recovered from blood. Staphylococcus vaccine. Recovery.

T. H., aged forty-five, entered the Buffalo General Hospital on January 28th with typical lobar pneumonia, involving the base of the right lung, having a temperature of 104° F., pulse 110, respirations 40. The course of the disease was uneventful so far as the pneumonia was concerned, but on the third day after his entrance, about the fifth day of the disease, he developed arthritis, involving the hands, feet, knees and slightly the shoulders and hips. The fever declined by lysis. Eight days after admission the temperature was 98.4° F. and remained practically normal thereafter. The arthritis, however, continued. A blood-culture revealed the presence of staphylococcus albus and pneumococcus. The patient was treated by staphylococcus vaccine with salicylates for the relief of pain. There was gradual improvement of the arthritis and the patient was discharged cured a month later. In this case we had, besides pneumonia, a mixed septicemia depending upon pneumococcus and staphylococcus with a general arthritis which in its symptomology did not differ from that of ordinary rheumatism save that it was accompanied by less fever. The leucocyte count was never above 16,000, and after the subsidence of the pneumonia, not above 12,000. In this case we expected to encounter a septic endocarditis, but we were disappointed. We were unable to procure fluid from the joint for culture, and we remained in doubt as to whether the arthritis depended upon pneumococcus or staphylococcus, upon both these or, possibly upon an intercurrent rheumatism, the result of some unknown organism. I am not prepared to state how much the vaccine had to do with the man's improvement. If we had not

made the blood culture, the case undoubtedly would have passed for rheumatism without further question.

Case 4.—Chronic valvular disease of the heart; lost compensation; acute arthritis; lobar pneumonia; septicemia; septic endocarditis; pericarditis; hemiplegia. This case illustrates an extraordinary array of pathology.

W. C., aged fifty, entered the Buffalo General Hospital February 9th. He had been discharged from the institution three months previously, somewhat improved from a grave disability dependent upon broken compensation, the result of chronic valvular disease of the heart. On his second entrance he was complaining of arthritis, the knees, ankles and wrists being involved, especially the right knee. This was treated according to the method devised by Dr. John B. Murphy, of Chicago, that is, the joint was aspirated, 8 c.c. of thick viscid fluid being removed, and without withdrawing the needle there was introduced 1 c.c. of a 2 per cent. solution of formalin in glycerin. Buck's extension was then applied. The patient was immediately relieved and the joint appeared well within thirty-six hours. A culture attempted from the fluid showed no growth. On March 8th, the rheumatism had practically disappeared and the man was regaining compensation of his heart. Then his temperature rose to 104, respirations at 40, and upon physical examination there was revealed a consolidation of the greater portion of the left lung. He developed a leucocyte count of 26,100, and the sputum showed the presence of many pneumococci, a moderate number of streptococci and many staphylococci, besides bacilli. On the third day of his illness, a blood-culture was taken from which grew an unidentified bacillus which was Gram negative and non-motile. Widal reaction was negative. A second blood-culture showed a definite pneumococcus growing abundantly. Soon after the patient developed an acute endocarditis and pericarditis, exhibiting remarkable variations in temperature and pulse. The temperature showed sudden excursions from 104 to 94° F. The pulse varied from 40 to 120. After a fortnight, the pneumonia having disappeared, and the heart condition showing improvement, the patient developed left hemiplegia, apparently from embolus. Four days preceding the hemiplegia, the leucocyte count had risen to 47,600. Following this the patient made some improvement and there were no other manifestations of ulcerative endocarditis aside from the physical signs, the hemiplegia and the continued leucocytosis. He survived another month showing a white count of 25,200, a few days before death. You will at once remark that this case represents something more than pneumonia. That is true, but leaving out of consideration the early heart trouble and the arthritis (the nature of which we were unable to ascertain), it would appear that the pneumococcus was responsible for what remained; that is, a lobar pneumonia (the pneumococcus recovered from the blood), fresh endocarditis (septic in character), an embolus resulting in hemiplegia, and a continued

leucocytosis. This would seem to stamp that case as one of general pneumococcus infection. We find that the man recovered from his pneumonia, but did not recover from the activities of the pneumococcus. It seems to me to be further evidence that a lobar pneumonia includes something in addition to a pneumococcus infection. Ordinarily, the lung produces an immunity and lobar pneumonia should reach deffervescence after the lapse of five or ten days; but this case illustrates that the pneumococcus may continue its baneful activities in certain regions of the body in spite of the systemic reaction and the pulmonary immunity following a lobar pneumonia. This is the same point that I wish to make in Case No. 2, in which there appeared a serious pneumococcus infection of the throat after convalescence from pneumonia.

Case 5.—Alcoholic; pneumonia; slight involvement; delirium; severe trauma; acute, general pulmonary edema.

D. H., a waiter, aged thirty-seven, entered the Buffalo General Hospital February 22d, complaining of sore throat, having a temperature of 104° F., pulse 120, respirations 30. It was the fourth day of the illness. He admitted drinking moderately, which was probably an under estimation. On physical examination there was found to be an area of consolidation of the lung, about two inches in diameter, located at the angle of the left scapula. There was no pericarditis. A few coarse râles were heard distributed in both lungs. There was a leucocytosis of 12,000. The second day after entrance, the patient became delirious, over-powered the nurse and jumped from a third-story window, a distance of 40 feet. He fell in a heavy snow bank and seemed not to be seriously injured. Following this, there was little change in the man's condition for three days, the pneumonia did not extend. Then there suddenly developed acute edema of both lungs which terminated fatally in a few hours.

In lobar pneumonia we encounter edema sometimes as the result of cardiac depression, aortic disease, or from uremia; also as an inflammatory edema associated with pneumonic lesions. In this case the edema seemed independent of any of these causes. What was the probable reason for the sudden acute edema in this case? Was it agonal? Let me postpone the question for a moment while I report another case.

Case 6.—Sudden invasion; high temperature, pulse and respiration; thoracic pain; termination by crisis; physical signs of localized edema.

Mrs. M. B., aged forty-six, subject to rheumatism and chronic endocarditis, entered the hospital on March 21st, suffering from weak heart and indigestion. On the morning of the 29th, her temperature suddenly rose to 104° F., pulse to 120, respirations to 32. There was herpes, moderate cyanosis, pain in the left chest, and the general appearance of pneumonia. Posteriorly, over the left chest, from the scapula downwards, there were heard diminished vesicular breathing and very faint friction sounds or crepitation. The voice sounds were unaltered. The reso-

nance on percussion was slightly diminished. A few scattered moist râles could be heard throughout the chest. The signs were otherwise negative and continued to be so. She had a leucocyte count of 15,200. Three days afterwards there were secured a few c.c. of fairly clear, mucoid sputum, containing brownish and gray particles in which were found many staphylococci, streptococci and large bacilli, besides many definite pneumococci. Three days after the seizure, the fever ended by crisis, and on the fourth day the temperature was normal and continued so. I regard this as a case of lobar pneumonia which went no further than a local pulmonary edema. In this connection, I desire to call your attention to a communication from MM. Guillain and Laroche, reported before La Société Médicale des Hôpitaux, on February 26th last (*Bulletin Médical*, March 2nd, 1910), entitled "Acute Edema of the Lung, the Sole Manifestation of Pneumococcus Infection." The authors report the case of a man forty-five years old, who, while in perfect health, was suddenly seized with acute pulmonary edema, with extreme dyspnea, in all features characteristic. He was relieved by blood-letting. The edema could not be attributed in this case to aortitis, nephritis or heart failure, but the day following his attack there was recovered sputum in which a virulent pneumococcus was found to be growing abundantly. In this case there was no fever and no auscultatory signs of pneumonia; the edema was the unique clinical manifestation. These authors regarded the edema as a manifestation of the pneumococcus infection of the lung, abortive in character, what might be called a frustrated type of pneumonia and the equivalent of that disease, and they make the interesting suggestion that in cases of this sort we are in the presence of an intense and salutary reaction of defense in which an immunity is quickly produced. The thought is an interesting one, and throws some light upon certain unexplained cases of acute pulmonary edema. This case differs from the last reported in my group in which the edema was localized and was accompanied by a fairly typical clinical picture of lobar pneumonia. It differs from the case preceding the last in which the edema was of that kind which we are accustomed to relate to the death agony. I am not sure that we are correct in our understanding of these terminal edemas. They are usually fatal, but occasionally are aborted by bleeding. Often the edema appears suddenly when the patient otherwise seems doing very well. I believe that there are cases of sudden edema usually regarded as a terminal or agonal edema which in point of fact are the result of local reaction to the pneumococcus and not primarily to the general failure of the patient. You will understand me as not denying that edema of the lung may develop as a final event in pneumonia as well as in other diseases. I am merely attempting to emphasize what seems to me to be a fact that the sudden edema appearing when the patient's general condition does not prepare us for such a development is not necessarily a terminal edema, and it may bear some relation to the edema described by the French authors.

Before the same Paris society, on a later date, was made a contribution on the same subject by M. Fernand Besanc (*Bulletin Médical*, March 9th, 1910), who relates cases somewhat similar to my own, in fact goes further by explaining that in edema of the lung which follows defect of the aorta or kidneys, there will be found in the expectoration evidence of an extensive pneumococcus infection of the lungs; and in cardio-renal cases with edema, he says that we meet with syndromes characterized by fever, oliguria, increased albuminuria with pulmonary symptoms, accompanied by expectoration in which the pneumococcus is found abundant and almost as a pure culture. Finally he relates cases that accord with the last two reported by myself in which the edema is explained by the direct action of the pneumococcus. I am inclined to attribute considerable importance to these communications for the reason that they offer an explanation of phenomena, the origin of which I have hitherto failed to understand.

THE SYMPTOMATOLOGY OF CONGENITAL PYLORIC STRICTURE IN INFANTS.

By CHARLES GREENE CUMSTON, M. D., of Boston.

The etiological factors of the pyloric syndrome in infants have remained rather obscure until recently. This affection arises in babies born at term who have presented nothing abnormal either in their weight or their general makeup at birth. Exceptionally, some have presented other congenital malformations; for example Ashby relates the case of an infant having an imperforate rectum, while Brandt records another where a stenosis of the ileo-cecal orifice was present along with the pyloric syndrome.

There is nothing particularly characteristic in the infant's heredity; pregnancy has usually been gone through with without any incident, although Ibrahim has pointed out that the mothers frequently suffered from gastric disturbances during their pregnancy.

Far more interesting is the study of the collateral antecedents, because, as Henschel has pointed out, three babies in the same family presented the pyloric syndrome, while Freund, Koppen and Ibrahim have recorded similar cases. However, such instances are infrequent.

The sex is of little importance, because out of a total of 30 cases there were 18 boys and 12 girls. Maternal or artificial nursing appears to have no bearing on the case, but it is not infrequent to remark that faulty feeding has been given, whether the child was breast fed or artificially.

The pyloric syndrome is a little known affection and if the number of published cases is to be considered as an expression of the frequency of a disease, one should conclude that the pyloric syndrome is very infrequent.

The theories emitted to explain the pyloric syndrome, although numerous, may be divided into three groups. In the first, we would place the opinions of those who admit a congenital malformation, a primary hyperplasia of the pylorus, without any spasm of the organ. In the second group we would place the partisans of secondary muscular hypertrophy, this being engendered by a spasm having commenced during intra-uterine life or having appeared after birth. In the third group we include the theory which considers the syndrome as being due to a simple spasm of the pylorus, the muscular hypertrophy being only secondary, one of the manifestations of contraction of the organ.

According to the first group of theories, the increase in the thickness of the pylorus is the result of a disturbance in the development; there

is a hyperplasia of congenital muscular tissue. According to Rivière the hypertrophy of the stomach and esophagus often co-exist with that of the pylorus and is simply a manifestation of the same anomaly in development, there being a too great formation of muscular tissue throughout this portion of the digestive tract, and he relates, relative to this primary hyperplasia of the pylorus, two cases where in one a hypertrophy of the colon was found, while in the second there was hypertrophy of the bladder. Flynn and Murray invoke comparative anatomy and Darwin's theory, believing that hypertrophy of the sphincter muscle, which accidentally exists in infants, is only a reproduction of a type that is normally encountered in edentated animals. According to Finkelstein, the hypertrophy is acquired secondarily, but here again the obstacle is congenital. For an unexplained reason, the infant is born with a narrow pyloric canal from which stagnation of the contents of stomach results, having as a consequence a complementary hypertrophy of the walls of the stomach and pylorus.

In the second group the authors admit that the thickness of the muscular layer of the pylorus is consequent upon spasm. Starting upon the basis that repeated contraction of a muscle engenders hypertrophy, a fact, they say, that can be quite as well verified in the case of unstriped fibers as for striped fibers, they believe that a similar phenomenon takes place in the pylorus. Thompson, who is a partisan of the theory of congenital hypertrophy, admits that the spasm commences *in utero*, following upon some irritative process, perhaps ingestion by the foetus of the amniotic liquid. This spasm exercises its effect on the development of the gastric nervous system and becomes permanent, from which arises the muscular hypertrophy. Here, again, the muscular hypertrophy, although secondary to spasm, exists before birth. According to Dawosky, the spasm occurs only after birth and is quite analogous to spasm of the pylorus in the adult produced by some irritating cause seated in the stomach.

The third group believe that the pyloric syndrome is due alone to spasm of the pylorus, and here it is necessary to consider the researches of Pfaundler on the stomach of nursing infants, which seems to us to considerably enlighten the question. His researches were carried out on a large number of stomachs, the babies having died from various diseases. They led him to consider several varieties of stomach, two of them particularly should call our attention—namely, (1) Those stomachs which he terms *systolic*, having thick, resistant and hard walls, having the aspect of a regular elongated tube of small capacity; (2) The second which he terms *hemisystolic*, in which the apparent thickening is only present in a portion of the stomach, particularly in the pyloric region. One then sees at a place in the pylorus a tumor with thick, resistant and hard walls, lined interiorly by the gastric mucosa; the pyloric orifice is contracted, hardly allowing the passage of a small catheter. Quite frequently also

a small projection, which may be compared to the cervix uteri, will be found on the duodenal side. Microscopic sections show that there is a thickening of the muscular layers. The systolic condition of the stomach may be made to cease by an injection of water under pressure into the gastric cavity. The muscular hypertrophy already described disappears and the stomach regains its normal condition.

Pfaundler found a great similarity between the hemisystolic stomachs and those met with at the autopsy of babies having died from stenosis resulting from a congenital hypertrophy of the pylorus. He insists upon the fact that, in many cases of congenital stenosis where autopsy has been done, that a true stricture of the pyloric orifice has never been found. In every instance it was a case of systolic stomach, whose pyloric orifice, the lumen of which appeared as if it would not allow the passage of a pin, regained its dimensions just as it did in those stomachs that Pfaundler dilated with water under pressure.

Still's researches on the pathological anatomy of this lesion seem to show that the circular muscular structures of the pylorus vary in thickness, even in subjects presenting no lesion or gastric phenomena during their entire life, but from the two cases that I have operated on, both of which showing such evident muscular hypertrophy that the pylorus was as large round as a good sized spool, it is very hard for me to believe that the lesion is not a congenital hypertrophy of the organ and that spasm plays no part whatsoever, or at any rate very little, in its production. I am fully aware that many eminent authorities uphold that the hypertrophy is due to spasm produced by an erosion of the gastric mucosa, but I still maintain that such marked hypertrophy of the pylorus cannot take place from spasm alone, more particularly so, when one takes into consideration the very short period of life during which the action of any spasm might intervene.

I will now consider the symptomatology of congenital stricture of the pylorus. The elements forming the pyloric syndrome may be classified under two headings. The first comprises the constant functional symptoms which appear at the commencement of the affection or arise during its progress. These are vomiting, occurring soon after birth and characterised particularly by its recurrence and persistency; and an obstinate constipation accompanying the vomiting. The second group of symptoms comprises those unconstant physical signs which are particularly to be observed after the syndrome has been present for a certain length of time and result in a certain amount of loss of flesh. These are peristaltic movements of the stomach and the presence of a pyloric tumor felt by palpation. I would, however, point out that the presence of a pyloric tumor is often difficult to detect on account of the large size of the liver in the newly born and young infants and in both my cases, although the neoplasm was of very large size in relation to the size of the subject, and although both subjects were extremely emaciated when operated

on, the lesion was not found until after the abdomen had been opened although a correct diagnosis had been made before interference.

Occasionally one will be dealing with a child from three to four weeks of age who has remained in excellent health from the time of birth and who, all of a sudden, without any appreciable cause commences to vomit all the milk ingested, while the stools which were up to that time regular, become infrequent. In spite of all the attempts to control vomiting it nevertheless persists, bringing about a very marked loss of flesh. Sometimes peristaltic movements of the stomach may be seen under the anterior abdominal wall, but as I have already pointed out a tumor in the pyloric region is less apt to be perceived.

The commencement of the process is not always as sudden and dyspeptic phenomena of a more or less pronounced type may be fore-running symptoms. From its birth the child may have been subject to frequent regurgitations which have not caused any particular alarm, while a diarrhea may have preceded the primordial manifestations of the syndrome for a few days, the latter consisting of vomiting and constipation. Sometimes, this dyspeptic stage is so marked that it is a difficult matter to come to a conclusion as to the exact time when the pyloric stage of the affection has become developed. Generally speaking, from the time that vomiting commences the diarrhoea suddenly stops for the simple reason that a very small amount of milk enters the intestine so that the latter loses its functions and the diarrhea ceases.

The time of commencement of the symptoms varies extremely, because the syndrome has been met with during the first days of life or it may be so delayed that the child reaches two or three months before it is manifest. But in going over the recorded cases it is from the second to the fourth week that the first symptoms make their appearance in the large majority of cases.

The vomiting occurs within the hour following the ingestion of milk and usually it is from twenty to thirty minutes after nursing; exceptionally it may take place later, occurring from one to two hours afterwards. It is in large quantity and usually corresponds in volume to the amount of milk taken at the feeding.

Occasionally the absence of vomiting following one or two consecutive feedings may lead one to hope that a small amount of milk will be retained, but disappointment comes, for the following nursing will give rise to a very abundant vomiting, because there has been accumulation and stagnation of the preceding nursings and the child seems to vomit more milk than he absorbed.

The vomiting usually occurs without any effort but occasionally it seems to be preceded by nausea during which the little patient appears to suffer, but after the stomach has emptied itself the infant is again calm. It is to be supposed that the vomiting, putting an end to the peristaltic movements of the stomach thus causes the pain which the latter produce, to disappear.

At the commencement of the affection the vomitus is only composed of curdled milk or it may contain rather fine curds; when the syndrome is of longer standing it will contain quite a large quantity of mucus and at this time it is not at all infrequent to find streaks of blood floating in the mucus.

Bile is never found, a fact which has been noted by all observers, and many attribute to this fact a certain value from the diagnostic standpoint because it would seem to show that the obstruction is seated in the pylorus and shuts off all communication between the stomach and the remainder of the digestive tract. According to Weill of Lyons, the absence of bile is not a very significant character from the standpoint of the pyloric syndrome, because to his way of thinking it simply indicates a vomiting taking place without much effort as is often encountered in nursing babies. Generally, the vomitus is odorless but when it has an odor lactic or butyric fermentation is the cause. The vomiting is far more rebellious than other varieties that are ordinarily observed in nursing infants. Generally, in the ordinary dyspepsias of early infancy a strict diet of one or two days will cause the gastric disturbances to disappear, while in the pyloric syndrome gastric incontinence is absolute.

With the appearance of the vomiting constipation becomes evident and an inverse relationship becomes established between the number of the movements and that of the vomiting. An infant who rejects all the nourishment taken naturally manufactures a very small amount of fecal matter, so that the bowels may not move for several days or even a week without giving rise to any apparent inconvenience.

The stools are usually composed of a small amount of mucus to which the addition of bile gives a greenish tinge. And lastly, and this is a symptom of the greatest importance, there are never any caseous lumps in the stools as long as the syndrome is in its acute stage; if they do appear they indicate that the pylorus has a tendency to become patent. Constipation may disappear for a few days during which there are normal stools or even diarrhea and in some of these cases this condition of affairs is probably due to an enteritis set up by the excessive use of nutritive enemata.

The baby loses much weight in a few days on account of the incessant vomiting and if the abdomen is examined at this time one is immediately struck by the difference existing between the lower part of the depressed abdomen which covers the empty and collapsed intestinal loops resulting from the pyloric obstruction, and the epigastric region which is distended and may even considerably project. Here the abdominal wall is tense and thin and under the recti muscles which are separated from each other along the linea alba to a considerable extent, the dilated stomach may be perceived. This marked change in the epigastric region cannot take place unless there is a marked distension of the stomach which, in the normal condition in the young infant, is partially covered by part of the liver and the transverse colon.

In order to make the peristaltic movements of the stomach evident the loss of flesh must also be accentuated. Sometimes the stomach renders the abdominal wall tense, forming a dome which becomes displaced like a wave, crossing over the epigastric region in from two to three seconds. On other occasions the constriction appears in the middle of the primary dome dividing it into two projections in which case the stomach takes on the shape of an hour-glass.

The direction of the peristaltic waves is slightly oblique from left to right, thus about following the greater curvature. The direction in which these movements are produced allows one to differentiate them from those arising in the colon, which are directed in an inverse sense. For that matter, in the pyloric syndrome the colon, which is collapsed and retracted towards the spine, cannot give rise to this cause for error.

Besides these peristaltic movements a contraction of the entire stomach is quite frequently met with and is a sort of tetanic condition of the organ which lasts for about twenty seconds. The various shapes taken on by the stomach are so clearly designed on the anterior abdominal wall that it might be imagined that the latter covered a solid organ, in which case the greater curvature can be palpated with as great ease as the border of the liver.

These various phenomena occur more or less shortly after the ingestion of food but sometimes they may be produced by friction over, or shocks upon, the walls of the stomach. They have been seen to remain longer than the other symptoms of the affection and may occur at a period when the vomiting has stopped.

The dilatation of the stomach noted in many cases may be made evident by the tympanitic sound elicited by percussion over the epigastric region, and by palpation, from the sensation which a gastric catheter gives when applied against the greater curvature.

These signs give sufficient indication as to the condition of the organ without any further exploration. I would point out that insufflation of the stomach may give rise to very serious symptoms and should, therefore, under no circumstances be resorted to.

In those cases where, on account of the rigidity of the stomach, the greater curvature shows its contour on the abdominal wall, simple inspection of the region will in itself allow one to determine the lower limits of the organ. A study of the peristaltic movements will allow one to come to the same result, the lowest point where these movements are seen practically coincides with the greater curvature. The lower limits of the stomach may reach to the umbilicus or even below and it has been noticed that the most declivous point is to be found a little to the right of the median line, this point corresponding to the pyloric antrum, the region of the stomach where dilatation is occasionally very marked.

Palpation will occasionally allow one to feel a tumor in the pyloric region but in looking over a long list of reported cases I find that it

has only been detected in about 25 per cent. When it is to be found, it is seated slightly to the right of the middle line 2 centimetres above the umbilicus, or thereabouts, and gives to the exploring hand the sensation of a little rounded elongated mass, possessing a certain mobility. The tumor is never detected at the commencement of the symptoms and in those cases where the syndrome commenced a few days after birth its presence could never be detected before the twenty-seventh day. This fact has served as an argument to refute the hypothesis of the congenital origin of the affection, but it is more likely that in order to carry out successfully such delicate palpation, it is necessary that there should be a special condition of the abdominal wall which is only to be met with when there is pronounced wasting and cachexia.

In one case, Batten noticed that the pyloric mass was not always to be felt by palpation and could only be perceived when the peristaltic movements could be seen under the abdominal wall or when the infant vomited.

When gastric lavage is resorted to the manifestations of motor insufficiency of the stomach are distinctly evident. The organ is never found empty and where the sound has been passed from four to five hours after the last nursing from twenty to fifty grammes of milk may be withdrawn, sometimes even a larger amount of liquid than was ingested at the preceding nursing. The contents are usually composed of mucus in which flakes of varying sizes float; when cow's milk forms the base of feeding these flakes are much thicker and denser than those withdrawn from the stomach of breast-fed infants. The question of the gastric chemism in the pyloric syndrome is far from being settled. While Finkelstein, Fenwick, Gran, Abel and Schotten were unable to find free hydrochloric acid but the presence of lactic acid and the fatty acids, other authors, as for example, Freund and Ibrahim, have found free hydrochloric acid more or less constantly in the contents drawn from the stomach. The former authority even considers this hyperhydrochloria a fundamental point in the pyloric syndrome when he concludes that there is a possibility of a primary hyperhydrochloria which sets up spasm of the pylorus.

Microscopical examinations undertaken by Gran showed the presence of a more or less considerable quantity of leucocytes and fat globules; there were no epithelial cells coming from the gastric mucosa. The bacteria found were various forms of cocci, diplococci and coliform bacilli and sarcinae.

Other than the phenomena met with in the stomach itself, an exploration of the other organs gives no further light on the question unless certain of the complications arise. The general condition becomes rapidly changed during the progress of the pyloric syndrome, the incessant vomiting having brought the child into an excessive loss of flesh and even cachexia. The urine is scanty and all the more so the more frequent

the vomiting; it may occasionally contain albumen and casts. Usually the temperature becomes slightly lowered and never, during the progress of the pyloric syndrome has a rise in temperature been noted, unless some complication arises.

Now that I have described the various symptoms forming the pyloric syndrome in the infant, I must endeavor to show how these symptoms become grouped and modified during the progress of the affection and in order to do so, some of the clinical types must be passed in review. There exist very serious forms where the recurrence and abundance of the vomiting reduce the little patient to a state of extreme atrophy in from two to three weeks. Frequently, the dyspeptic disturbances at the commencement are mild when, on the contrary, the benign types will be found to succeed very marked gastric disturbances. There is, consequently, no direct relationship between the forerunning dyspeptic symptoms and those of the pyloric syndrome that they engender.

When once the vomiting has become declared, everything for its control is useless and time is lost in trying to change the nature or quantity of the feedings for the vomiting will continue. This will continue until the child is in such a state of cachexia that death occurs. Physicians frequently resort to gastric lavage at this time which, of course, is useless and may even be dangerous as it greatly increases the already exhausted condition of the infant. During this time there is no movement and two or three, or even more days may pass without any intestinal evacuation; intestinal enemata are usually repeated, always unsuccessfully, the fluid returning hardly colored or, if so, it is only from the mucus.

It is in this type of the affection that peristaltic movements of the stomach are observed very early in the progress of events and not infrequently palpation will reveal a tumor in the pyloric region. Loss of flesh is rapid and death will occur if operative measures are not quickly resorted to.

In some few cases the feedings may be retained for a few days and the child may only have one or two attacks of vomiting a day. A little undigested milk appears in the stool and the general impression is that the infant will recover. But the vomiting soon reappears with all its former severity and it is with these alternatives of improvement and recurrence that finally lead to death because operation is delayed. This condition of affairs may last several months although this is far from being common.

Certain so-called attenuated types of pyloric obstruction have been described in which the attacks of vomiting are not so frequent as in the form already considered. Two or three attacks of vomiting a day is about all that happens, and although there is constipation it is not absolute and from time to time the child voids caseous curds in the fecal matter. Occasionally, during a short lapse of time, the infant may have spontaneous and nearly normal stools. The peristaltic movements and a

pyloric tumor are hardly, if ever, perceived. Certain internists believe that if the quantity and quality of the milk can be made to suit the infant, a cure may be brought about, but in my opinion if such a result is obtained, the case is not one of true congenital pyloric stenosis.

There are other types in which the dyspeptic phenomena preceding the development of the affection are more marked than the symptoms of the latter. During the first month of life, the infant is seized with regurgitations, more or less regular vomiting, he has from three to four loose stools daily, while the body weight increases very slightly or remains stationary. This condition may exist for two or three weeks and then suddenly the pyloric obstruction will completely change the clinical aspect of this catarrhal condition. The vomiting increases in frequency, becomes abundant and regular, occurring nearly after each feeding, while the diarrhoea disappears and constipation supervenes; the pyloric syndrome then evolves on its own account with more or less gravity. As has already been pointed out, there is not of necessity a direct relationship between the intensity of the dyspeptic symptoms and the gravity of the superadded pyloric state and it would even appear that the types in which the gastric disturbances have been the most intense at the commencement are more prone to give rise to a milder pyloric syndrome.

There is still another form described by Weill and Péhu under the name of *essential pyloro-spasm of infancy*, which from certain symptoms is in a way similar to the pyloric syndrome but is different in many others. Pyloro-spasm generally commences with regular, easy vomiting, without odor and occurring from a quarter to a half hour after the feeding. Other than the vomiting, there is no other symptom such as diarrhea, constipation, pyloric tumor, or peristaltic movements of the stomach accompanying the regularly recurring attacks of vomiting. There is a progressive decrease in the body weight, while the appetite is normal or even somewhat exaggerated, but there is no change in the general condition which would indicate an infection or intoxication and the temperature is never raised. I have mentioned this condition on account of the prominence of the men who have described it, but personally I have never been consulted surgically for any condition that I could diagnose as pyloro-spasm.

I have pointed out that the serious types of pyloric obstruction are characterized by an acute phase which may last from two to six weeks; then the affection continues its evolution with periods of slight improvement, alternating with those in which the vomiting takes on all its intensity. I believe that no genuine case of congenital pyloric obstruction has ever been recovered from unless gastro-enterostomy is resorted to. Otherwise death occurs sooner or later in the serious forms within a few weeks from the onset, in the less rapidly progressing cases life may be prolonged several months.

A certain number of complications may occur during the pyloric syn-

drome, particularly when the latter is well advanced and they are always of bad prognosis. These complications are foci of broncho-pneumonia, convulsions, sometimes accompanied with the Cheyne-Stokes respiration. Occasionally the convulsions have been seen to take on the tetanic type.

When all symptoms are present, the syndrome has such distinct characteristics that it is most easy to diagnosticate. Vomiting occurring during the first week following birth, persisting in spite of every form of feeding, a more or less marked constipation, the small amount of residu coming from the rectum being composed of greenish mucus containing no curds; a progressive emaciation with the flattened abdomen, occasionally allowing one to perceive peristaltic movements over the stomach; less frequently the detection of a pyloric tumor revealed by palpation; all these signs when they are present make the diagnosis evident.

There are, however, cases in which the peristaltic movements are not visible and a very large number where no pyloric tumor can be detected, so that the problem becomes more complex and hesitation is quite permissible. It would seem to be a difficult matter to mistake the regurgitations of an overfed infant for the vomiting due to pyloric stenosis. The regurgitation immediately follows the ingestion of milk and the feeding is rejected in a liquid and non-coagulated condition, the general health is not disturbed, the child does not lose flesh and all the symptoms disappear when the nursings have been properly regulated.

It is a more delicate question when one is dealing with certain types of infantile gastro-intestinal dyspepsias. I am not referring here to the frank types, in which the vomiting is accompanied by a diarrhea containing a large amount of undigested milk, but to that form described by Marfan, under the name of dyspepsia with predominance of gastric phenomena. In these cases the vomiting predominates, there is no diarrhea, stools are normal, both in number and quality. One may rightly hesitate before making a diagnosis of a mild type of pyloric syndrome or of this form of dyspepsia. The rapid cessation of the vomiting as soon as the infant is placed on a water diet, attacks of diarrhea occasionally occurring in the midst of periods of normal stools, the history of the illness which will show the mistakes committed in the feeding are quite enough to lead the physician to a diagnosis of dyspepsia with predominating gastric symptoms.

In the types of chronic dyspepsia observed in nursing infants who are receiving artificial feeding, there is constipation, but the latter is often interrupted by attacks of diarrhea, a fact which has given it the name of chronic dyspepsia with intermittent intestinal catarrh. And what is more, vomiting is frequent, the abdomen becomes large and lax on account of the elongation of the intestine, so that all these symptoms are sufficient to differentiate the affection from the pyloric syndrome.

Exceptionally, one may be obliged to differentiate symptoms produced by a stricture resulting from some congenital malformation of the diges-

tive tract, from the pyloric syndrome. In point of fact, these cases which are very rare, are characterized by much earlier phenomena and from the start are far more serious than those of the pyloric syndrome. They occasionally even present certain signs of their own which will allow one to locate the seat of the lesion.

Congenital stricture of the esophagus is made evident by regurgitation rather than by vomiting; the milk is rejected almost as soon as taken without having undergone any change from the addition of the gastric juice. Occasionally the infant will present cyanosis after feeding because the oesophageal cul-de-sac, distended with the fluid, acts by compression on the hilum of the lungs.

In pyloric stenosis of the congenital type and which has contracted down at the time of birth so that the syndrome becomes evident during the first day or two of life, there will be complete constipation and after the meconium has been expelled there will be no stool. The effect on the general health is very rapid and intense and unless gastro-enterostomy is immediately resorted to death will occur within a week or ten days.

Congenital stricture of the intestine also gives rise to tenacious vomiting and constipation; the meconium is not always expelled and, a sign of capital importance, the abdomen becomes rapidly distended. Bile will also be found mixed with the vomited matter.

This picture of acute intestinal occlusion may also occur during various processes, some being frequent like intestinal invagination, others far more rare, such as neoplasms, but they can hardly be mistaken for a congenital pyloric obstruction. The vomiting of the acute peritonitides of the newly born is accompanied by abdominal distension, frequently a very marked diarrhoea and a rise in temperature, all being symptoms which distinctly differentiate it from the vomiting of the pyloric syndrome.

A SAFE GUIDE FOR THE ADMINISTRATION OF TUBERCULIN.

By OSCAR H. BENKER, M. D., of St. Louis,
Clinician to Washington University Hospital.

After a period of bitter disappointment which followed the first tuberculin era in the nineties, due to a faulty technique and erroneous conception of its action, tuberculin has won to-day a definite position in our therapeutic armamentarium.

It still has, however, many enemies, among which are primarily the men who condemn all things without a trial, and others who through the production of toxin intolerance have had disastrous results.

The great majority of clinicians the world over hold that tuberculin used carefully, beginning with minimum doses, increasing slowly and extending the treatment over a year or two, produces results such as no other remedy or treatment does, climatic treatment not excluded.

The tuberculin therapy, therefore, belongs to the province of the family physician, whose duty it is to familiarize himself with the underlying principles and to master the technique of its administration.

It is the purpose of this paper to make more generally known a method for its administration, which is absolutely safe, applicable to all tuberculins and advocated and used for a number of years by Sahli.

That tuberculin is both an agent for good and for harm has been amply demonstrated in the twenty years of its existence.

To overcome the harmful side of the tuberculin therapy, Sahli has given us a scale which allows a much finer dosage than the ordinarily used scale of Denys.

The two illustrations taken from Sahli's monograph on tuberculin therapy show clearly the difference between the two scales.

Denys's scale follows potencies of 10, while Sahli's recommends potencies of 2, to avoid the doubling of the dose which occurs according to Denys's scale when a stronger solution is used. In Sahli's scale the increase is only by $\frac{1}{3}$.

From theoretical views and practical results, Sahli has come to the conclusion, that the underlying principle for treatment is the same with all tuberculins, but that Béraneck's tuberculin has certain advantages.

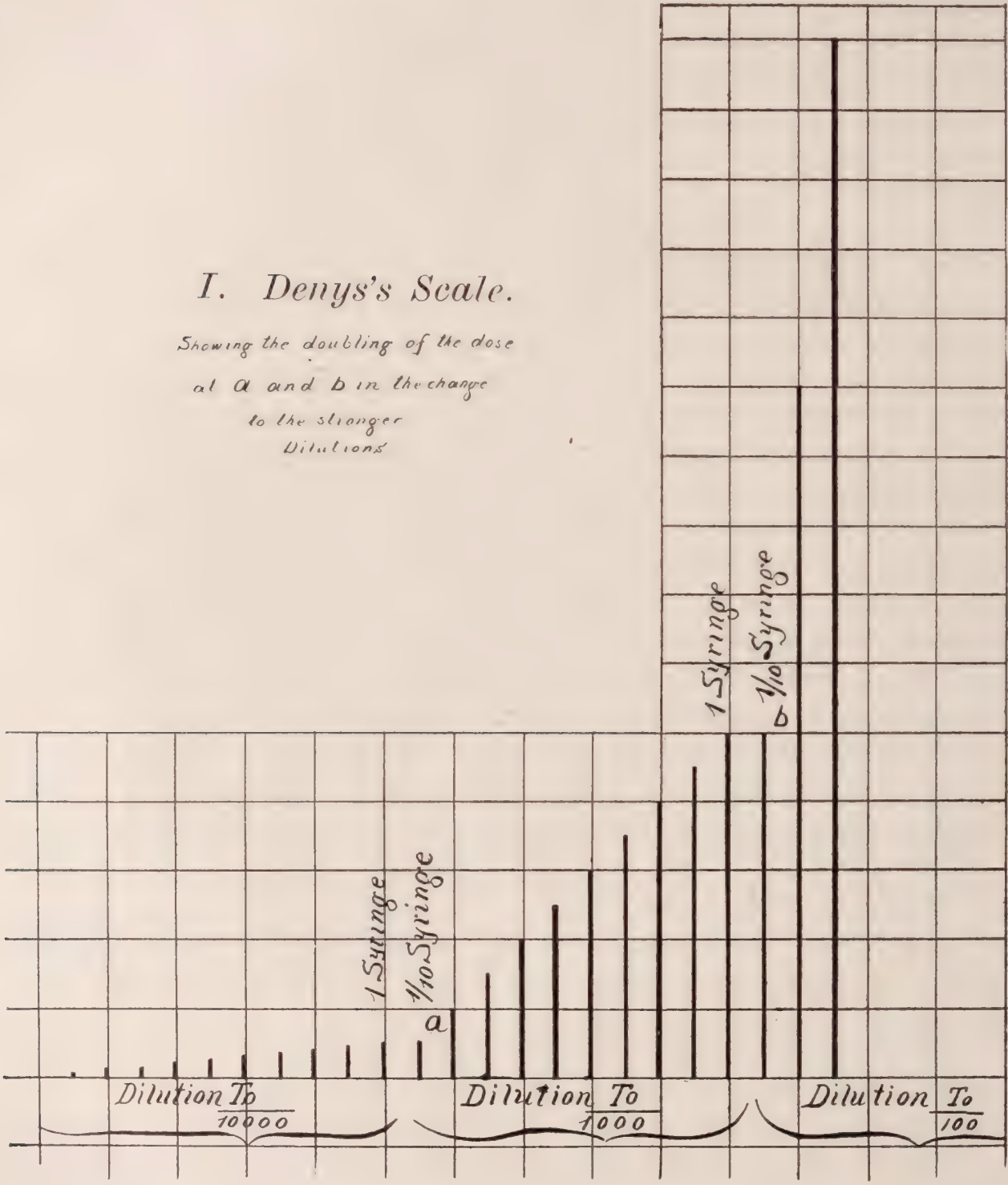
This I have been able to confirm after comparing my results with O. T., B. E., B. F., both human and bovine strains.

Béraneck's tuberculin is a mixture of the exotoxins extracted from a peptone—free medium—and the endotoxins extracted from the tubercle bacilli with 1 per cent. orthophosphoric acid.

This tuberculin in its concentrated form is a strong germicide, killing the tubercle bacilli in forty-eight hours. This latter quality has been demonstrated in surgical tuberculosis where it has been used successfully as intrafocal injections.

I. Denys's Scale.

*Showing the doubling of the dose
at A and B in the change
to the stronger
Dilutions*



To the normal individual it is only slightly toxic, while tubercular subjects react to doses of 0.000001 c. cm.

Béraneck's tuberculin is obtainable in nineteen dilutions as follows:—
H. G. F. E. D. C. B. A. $\frac{A.}{2}$ $\frac{A.}{4}$ $\frac{A.}{8}$ $\frac{A.}{16}$ $\frac{A.}{32}$ $\frac{A.}{64}$ $\frac{A.}{128}$ $\frac{A.}{256}$ $\frac{A.}{512}$ $\frac{A.}{1024}$ $\frac{A.}{2048}$

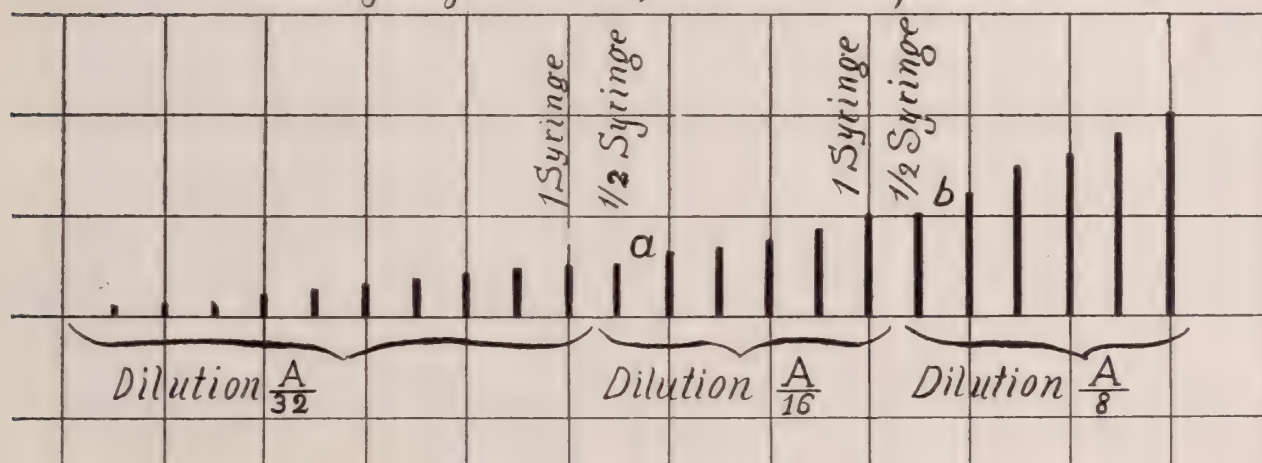
H. is the strongest solution used therapeutically and is 62½ times weaker than the concentrated Béraneck tuberculin.

The dilutions are made with an 0.8 per cent. solution of sodium chloride under strict asepsis.

For adults, who are free from fever, $1/20$ c.cm. of sol. $\frac{A.}{64}$ is a safe dose to commence the treatment. In slight elevations of temperature up to 100° F., I usually start with $1/$ c.cm. of $\frac{A.}{256}$. In severe cases where absolute rest, outdoor treatment or the salicylates fail to reduce the temperature, I have given $1/20$ c.cm. of $\frac{A.}{2048}$ a trial with some success. It is well to repeat the first dose two or three times; if well tolerated each dose is increased by $1/20$ c. cm. until $1/2$ c. cm. of $\frac{A.}{64}$ is reached. If $1/2$ c. cm. of $\frac{A.}{64}$, after repeating the dose two or three times, produces no reaction, then $1/20$ c. cm. of $\frac{A.}{32}$ is injected in the same

II Sahli's Scale.

Showing the gradual step like increase of $1/5$ at a and b.



manner as the previous injections, and so on until the whole scale has been run through.

If during the course of treatment reactions occur, these are allowed to wear out entirely and the treatment is recommenced with lower doses.

The injections are made twice a week; when stronger dilutions are reached, only once a week, and with the strongest solutions G. and H., only every fourteen days.

It will be found in practice that it is not necessary to reach the maximum dose; in fact, at times this is impossible. I have noticed cases which do well on $1/5$ c. cm. of $\frac{A.}{64}$, increase in weight, where the signs and symptoms of the disease disappear; but when the next dose $3/10$ c. cm. is used become febrile and decline. This observation has been reported by Sahli, Mantoux and others. Mantoux recently reported a case of renal tuberculosis in which one kidney had been removed for a tubercular infection and the remaining kidney became involved. He treated the case with Béranek's tuberculin, starting with 1 drop of $\frac{A.}{256}$, but reducing the dose to sol.

$\frac{A.}{512}$, of which the highest dose used was 7 drops.

All objective and subjective symptoms disappeared in this case.

Thus in each case an optimal therapeutic dose is reached, varying in the scale from the weakest to the strongest solutions, on which the patient improves and which should not be exceeded until the case becomes stationary when the dose is again increased.

In a given case we may thus reach several optimal doses and finally come to the maximum dose; on the other hand, perfectly satisfactory results are obtained on dilutions from $\frac{A.}{64}$ to A. without ever reaching H.

To show this more clearly I will cite a case now under observation, where a temperature of 100° F. was reduced to the normal on dil. $\frac{A.}{256}$ and the patient gained eight pounds in weight in three months.

It will be seen that a high toxin tolerance is not necessary for good therapeutic results.

Fever, pain, malaise, focal reactions, loss of weight, all or only one of the enumerated signs, shows that the optimal dose has been exceeded, requiring, therefore, a reduction of the dose.

The indications and contra-indications for a successful tuberculin therapy apply also here.

In conclusion I wish to emphasize that not all cases will tolerate tuberculin, no matter in which way it is used. For these climatic treatment, remineralization and other methods of treatment must be sought for. However, one thing stands out preëminently in this method of tuberculin treatment—namely, that it is safe and will not harm the patient and can be used in private as well as dispensary practice.

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MEDICAL AND SURGICAL PROGRESS.

THE USE OF MOMBURG'S CONSTRICTION-BELT IN OBSTETRICAL PRACTICE.

A REVIEW OF RECENT LITERATURE.

By. HUGO EHRENFEST, M. D., of the Editorial Staff.

1. Amberger: Death after Application of the Momburg Belt. (*Beitr. zur klin. Chir.*, April, 1910.)
2. Blecher: Metal Spiral Spring for Belt Constriction. (*Muench. med. Wochenschr.*, No. 27, 1910.)
3. Burk: Momburg's Belt*: (*Beitr. zur klin. Chir.*, June, 1910.)
4. Carere: Experiments with Belt Constriction. (Orig. in *Riforma Med.*, Abstr. in *Jour. Amer. Med. Assoc.*, p. 2010, June 11th, 1910.)
5. Duehrssen: Metreurynter-Incision (*Gyn. Rundsch.*, H. 1, 1910.)
6. Ehrlich: Exclusion of Musculature as Source of Heat Production during Momburg Constriction. (*Wien. klin. Wochenschr.*, April 7th, 1910.)
7. Engelhorn: Digital Compression of Aorta as a Means of Arresting Placental Hemorrhage: (*Zentralbl. f. Gyn.*, No. 16, 1910.)
8. Engelmann: Momburg's Anemia in Obstetrics. (*Arch. fuer Gyn.*, Vol. 90, H. 1.)
9. Flatau: (*Muench. med. Wochenschr.*, No. 7, 1910.)
10. Frankl: Experiments with Momburg's Waistline Constriction. (*Gyn. Rundsch.*, H. 2, 1910.)
11. Gelyi: Modification of Momburg's Constriction. (*Mediz. Klinik.*, August 28th, 1910.)
12. Gerster: Momburg's Method of Artificial Anemia by Suprapelvic Constriction. (*Annals of Surg.*, June, 1910.)
13. Gross and Binet: Fatalities During Belt Constriction. (*Revue de Chir.*, May, 1910.)
14. Hoehne: Compression of One or Both Ureters by Means of Momburg's Belt. (*Muench. med. Wochenschr.*, No. 8, 1910.)
15. Hofstätter: Treatment of Post-Partum Hemorrhage. (*Mon. fuer Geb. u. Gyn.*, October, 1910.)
16. Ilmer (*Gyn. Rundsch.*, No. 14, 1910.)
17. Kroening (*Deutsche med. Wochenschr.*, November 18th, 1910.)
18. Kupferberg (*Muench. med. Wochenschr.* No. 24, 1910.)
19. Liepmann: Das geburtshilfliche Seminar. Berlin: Hirschfeld, 1910.

*Wherever in this bibliography the exact title of the paper is not given it is Momburg's Belt Constriction.

20. Matas: Momburg's Artificial Anemia. (*Jour. Amer. Med. Assoc.*, p. 163, July 9th, 1910.)
21. Momburg: Artificial Anemia of the Lower Half of the Body. (*Zentralbl. fuer Chir.*, October 10th, 1908.)
22. Momburg (*Deutsche med. Woch.*, December 2nd, 1909).
23. Ordonez (Orig. in Spanish; Abst. in *Muench. med. Wochenschr.*, November 1st, 1910).
24. Popow (Orig. *Russky Wratsch*; Abstr. in *Muench. med. Wochenschr.*, No. 14, 1910).
25. Seitz: Vaginal Hysterotomy: (*Arch. fuer Gyn.*, Vol. 90, H. 1.)
26. Sigwart (*Arch. fuer Gyn.*, Vol. 89, H. 1).
27. Sigwart (*Berl. klin. Wochenschr.*, No. 43, 1909).
28. Sigwart: Treatment of Placenta Previa. (*Zentralbl. f. Gyn.*, No. 28, 1910.)
29. Stolz: Momburg's Constriction in a Case of Ruptured Ectopic Pregnancy. (*Zentralbl. fuer Gyn.*, No. 41, 1910.)
30. Tornai: Influence of Momburg's Procedure on Heart and Circulation. (*Deutsche med. Wochenschr.*, September 8th, 1910.)
31. Weber: Treatment of Post-Partum Hemorrhage. (*Muench. med. Wochenschr.*, May 17th, 1910.)
32. Zur Verth (*Muench. med. Wochenschr.*, January 25th, 1910).

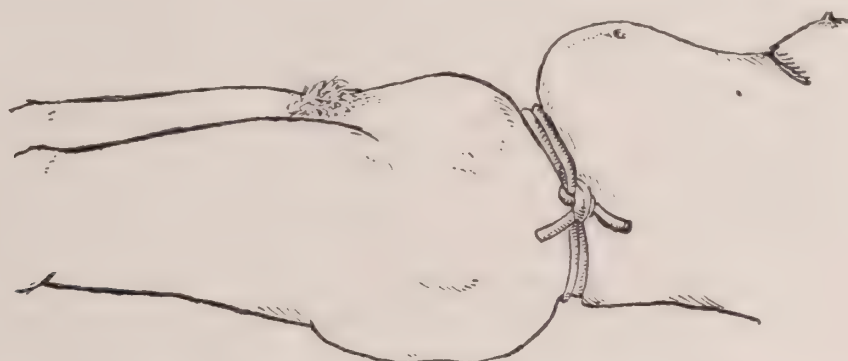
In 1908 Momburg published a short preliminary report of his method of producing an artificial anemia of the lower half of the body by winding a rubber tube tightly around the waistline. His suggestion met the usual fate. At first the procedure seemed too heroic and numerous theoretical objections were raised. Then followed the period of extreme enthusiasm with a criticless exploitation of the method also in most unsuitable cases. To-day the advantages and dangers, the indications and contraindications of Momburg's method seem well understood, and without exaggeration it can be stated that Momburg has given to the profession one of the most valuable and effective methods of arresting the most dangerous forms of hemorrhage. While originally suggested chiefly for the use of the surgeon, Hofbauer, probably as the first, soon recognized the importance of belt constriction in obstetrical practice. A careful study of the literature, already comprising hundreds of articles, leaves no doubt concerning the justification of a demand, made among others by Flatau, that to-day Momburg's belt should be found in every obstetrical bag. In that splendid exposé of practical obstetrics, recently published by Liepmann, we find numerous references to this new method, and we read on page 126: I should advise strongly never to respond to an obstetrical call without taking along a good, strong red rubber gas tube, about two yards long.

Before entering into a discussion of the literature pertaining strictly to the use of the constricting belt in obstetrical work, it may not be amiss to consider first papers dealing with the technique of the procedure, with its dangers, and with experiments made on the human being and animals to ascertain exactly the effect of such tight constriction of the body at the waistline.

In the following we quote a description of the technique as given by Gerster, but it may be stated that obstetrical cases demand a certain variation in the procedure, as will be pointed out later. The patient is placed in Trendelenburg's position. The end of a piece of soft rubber tubing, having the thickness of the index finger, and a length of about four

feet, is passed through under the back of the patient, to be grasped by the hand of an assistant who stands at the other side of the operating table. The tube then is stretched to the utmost, and, thus stretched, is passed by the surgeon midway between the border of the ribs and the iliac crest across the abdomen to the other hand of the assistant, whose duty it is to maintain the tension. The free end of the tube is now led back under the patient by the surgeon and is again put to the stretch, the assistant in the meantime gradually releasing the bent of the stretched tubing which now firmly encircles the waist. While this is being done another assistant places his finger on the femoral artery to ascertain the moment of the cessation of the pulse. Observing the same steps, two, three or more turns of the tubing are exactly superimposed until the femoral pulse disappears. In slim individuals two turns will suffice. In fat or muscular ones as many as six may become necessary. As soon as the femoral pulse is suppressed the ends of the tubes are crossed, to be secured by forceps or ligature.

A more complete anemia can be obtained, if the application of the belt is preceded by bandaging both lower extremities from the toes up to the groin. If after tightening of the belt these bandages are removed and the extremities lowered, the blood contained in the pelvic organs will gravitate down into the limbs.



Momburg's Belt properly applied after labor. From Liepmann's *Geburtshilfliches Seminar*. 1910.

It seems essential, at the time of the removal of the Momburg belt, to permit the blood only gradually to return into the parts of the body which had been excluded from the circulation. For this purpose constricting bands are applied to both groins below Poupart's ligaments and possibly also below both knees. The successive removal of these constrictions permits the more gradual influx of the blood into the anemic areas.

Already in his first communication Momburg mentions that at times it may become necessary to use morphine for an excessive pain, caused by the constriction. In another paper, Momburg calls attention to the following particular features of the technique, at present employed by him: The pelvis should be raised rather high, so that the intestines will slip upward out of the way. To aid this condition he does not hesitate to shake the abdomen. He emphasizes the advantage of application of Esmarch bandages to both thighs as a preliminary procedure. Without this, by raising the pelvis high, too much blood may be sent down into the region of the heart. Instead of stretching the first circle of the rubber tube very tight, he prefers winding of the tube around the waistline more often. At the time of writing, he had employed his method more than 200 times, including two patients with cardiac lesions. Zur Verth sug-

gests that an unnecessary and harmful degree of constriction could be avoided by the use of an accurate pulse controlling apparatus on the femoral artery. In this article the interesting fact is noted, that by the exclusion of a large portion of the body from circulation, Momburg's belt distinctly lessens the amount of the narcotic necessary to obtain and maintain a complete general anesthesia.

For how long a time can aortic compression be exercised without detriment? Momburg himself used it up to 45 minutes. Engelmann placed the bandage on the same patient three times in short succession, leaving it in position during the total time of one hour and 45 minutes. Sigwart in one instance left the belt for two and a half hours without noticeable harm. Gerster thinks that the constriction could safely be continued for three hours.

The chief dangers of Momburg's method obviously lie in the possible harmful mechanical effect exerted by the tight constriction upon the intestines, large blood-vessels, ureters, etc., and in the alteration of blood-pressure caused by the sudden elimination of a large part of the circulation.

Amberger records the following case: 'The belt was applied to an aged and infirm man who had to be operated for a lacerated femoral artery. The patient collapsed when the belt was removed. Autopsy showed stasis hemorrhages in the pleura, edema in the lungs and some fluid in the pericardium. These evidences of severe congestion in the upper part of the body in his opinion must be ascribed to the action of the constricting tube.

In a case reported by Burk (a woman operated for a vulvar fibroma) the pulse remained good during and immediately after the operation. About an hour later the pulse became imperceptible. Saline infusion with adrenalin brought some improvement. The patient died next day with symptoms of peritonitis. Autopsy revealed small patches of gangrene in the small intestines which had led to the peritonitis. Circular strips of suffusion in the walls of some loops of the small intestines were unmistakable signs of direct strangulation. He ascribes the unfortunate result in this particular case to the fact that the patient was very thin and debilitated. Burk concludes logically that Momburg's belt should not be used on very thin patients or when there is present or suspected an ulcerated or chronic inflammatory condition of the intestines. This writer refers to an observation recorded by Pagenstecher of an ischemic paralysis of the distal end of the spinal cord subsequent to belt constriction.

Kupferberg mentions a death resulting from a hematoma caused by the tear of the intima of a large bloodvessel.

Gross and Binet quote the following ill effects of constriction: a case of Willems in which blood issued from the mouth of a patient after the use of belt-constriction; a case of Guinard of blood stained sputum; an intestinal hemorrhage observed by Pieri; a gangrene of the thigh seen by Kempf, and a fatality possibly due to constriction recorded by De Bovis. Duehrssen made two vaginal hysterectomies under belt constriction, in both instances the belt having been applied by Momburg himself, and lost one of these patients from an embolism, in his belief caused by an injury to the intima of one of the larger abdominal bloodvessels. He, therefore, warns against the use of waistline constriction in an article dealing with vaginal Cæsarean section, while considering the means of controlling the hemorrhage during this particular operation.

In a case of Ordonez of severe post-partum hemorrhage 25 minutes after the application of the belt the pulse became small and extremely fast. The patient became cyanotic, pupils dilated and, therefore, the belt was removed quickly.

There is one more fatality on record, and it may be stated that in a rather careful search of the literature no other accounts of death or serious accidents, ascribed to the method, have been found outside of those already quoted. Gross and Binet applied the tube to prevent serious hemorrhage during a disarticulation of a hip. A minute after the tube was removed the patient collapsed. Autopsy showed acute distention of the heart, undoubtedly favored by an unsuspected fatty degeneration of the cardiac muscle and an old mitral and aortic endocarditis. Sigwart had occasion to perform autopsies on two patients who died from post-partum hemorrhages in spite of the use of Momburg's belt. In both cases absolutely no signs of a harmful effect of the constriction upon the abdominal organs could be detected.

The present better understanding of the possible harm of waistline constriction in certain patients under certain conditions is the result of the forementioned autopsies and large series of interesting experiments. Carere's experiments on dogs showed that no permanent disturbances resulted from the constriction. Invariably there was found, however, a tendency to paralysis of the legs, but it always retrogressed sooner or later according to the technique applied. When the rubber tube was more than one and a half inch in diameter, serious injury to abdominal organs was occasionally observed, but when Momburg's technique was followed strictly the disturbances were only transient. Tornai experimented on young persons with normal nervous system and either normal hearts or well compensated cardiac lesions. In every case the number of systoles and the blood-pressure were notably increased. When the belt was removed the pulse grew weaker, in some cases becoming very weak and irregular. His experience emphasizes the necessity of a careful examination of the functional capacity of the heart beforehand, testing it by the Katzenstein or some other reliable method. Any suspicion of heart disease or arteriosclerosis, exophthalmic goitre, nephritis or plethora, in his opinion, should be considered a contraindication against the use of this method. Investigations made by Matas on young men led him to the conclusion that in cases of weak hearts the method is liable to fail. Instead of the usual increase in blood-pressure, there will be a fall and this in his opinion, indicates an inability on the part of the heart to keep up. In strong and robust individuals the method will be of great benefit and free of harm. Of greatest interest and practical importance are the experiments made by Frankl. He found rabbits unsuitable for these investigations because in them, very unlike to the conditions in man, both vena cava and aorta lie well protected between two large muscles. Large dogs prove more valuable in these studies, although in them the aorta is better protected against compression by the overlying intestines than in the human. In general Frankl confirms the reports of other experimenters to the effect, that intestines, peritoneum, the mesentery, etc., are not harmed by the pressure. He studied in particular the effect upon the endothelium of the larger blood-vessels, but found distinct lesions only in a rabbit, constricted for two hours. In this instance the vena cava contained a large thrombus, an observation of some interest in relation of the report of Duehrssen, already referred to, of an embolism subsequent to the application of Momburg's belt. Frankl found, that

respiration during constriction becomes faster, because the diaphragm is impaired in its excursions, it being pushed high up. The heart also is pushed up and turned, the apex lying higher and more to the left. He suggests, that in the case of the woman immediately after delivery, on account of the relaxation of the abdominal walls, the required amount of constriction probably can be obtained without this effect upon either diaphragm or heart.

A most important question is that of the change in blood-pressure. Mention has already been made of the advice given by Momburg to apply Esmarch's bandage around both thighs before the patient is placed into Trendelenburg's posture, preceding the application of the belt. Momburg attempts in this manner to avoid a dangerous rise in blood-pressure. Frankl found that this rise probably is chiefly due to the Trendelenburg posture itself. If the belt was applied in the flat horizontal position, the blood-pressure remained practically unchanged, with but a slight fall, when the belt was loosened. Therefore, those special precautions described above, which should be taken at the time when the constriction is released, seem necessary only when the belt was applied with the patient in the pelvic elevated position. These points are of special importance in view of the fact, that they forcibly prove the particular fitness of Momburg's method in obstetrical work. While in surgical work the procedure mostly is used in an attempt to produce an anemia during an operation, and thus the Trendelenburg position becomes an essential factor in the procedure, the obstetrician will find this new method of greatest value as a means of checking promptly a profuse uterine hemorrhage. Indeed, it seems that the method has been most often and most successfully employed in cases of serious post-partum hemorrhages. Under these conditions the belt is applied on an exsanguinated, anemic patient. Experiments on exsanguinated dogs showed that the application of the belt proved dangerous because the heart would begin to beat empty, the constriction having eliminated a large portion of the already dangerously reduced quantity of blood from circulation through the heart. Experiments on such dogs showed that Trendelenburg position alone would not overcome this danger, but that a sufficient amount of blood could be sent to the heart, if both lower extremities were bandaged from the toes up to the thighs preceding constriction. Frankl concludes that the obstetrician when dealing with exsanguinated patients should resort to Trendelenburg's posture in fairly anemic patients, but carefully bandage both extremities with elastic bandages from the toes up, whenever the anemia is of a serious character.

This very important point raised by Frankl concerning proper consideration of the degree of anemia, in the opinion of Stolz, probably explains his own failure with Momburg's method in a case of extreme anemia as the result of a ruptured tubal pregnancy. He employed the customary surgical technique of constriction, and the patient collapsed immediately, so that the belt had to be removed. It is only fair to assume, that the unfavorable experiences of others in the past will be avoided in the future by the general acceptance of Frankl's teachings.

Of interest in this connection is an observation of Ehrlich concerning the effect of the belt on the patient's temperature. He applied the belt to arrest a hemorrhage resulting from an injury to the groin. The tube was left in place for 32 minutes. The temperature had fallen to 35.2 C., and did not return to normal for 5 hours. This experience induced him to experiment on animals. He came to the conclusion that motor

and chemical insufficiency of the musculature cut out from circulation leads to a marked disturbance in heat production. In his opinion, this observation calls for special care in the application of the belt on very anemic patients, another point of special interest to the obstetrician.

In obstetrical practice, as repeatedly mentioned, the belt most often is applied soon after delivery. The abdominal walls are relaxed and the suppression of the pulse in the femoral artery will be obtained with a comparatively smaller amount of constriction. Therefore, as a rule, the obstetrician less often will meet with an undesirable occurrence described by Popow, also mentioned by Hoehne. If the patient vomits during the constriction, the sudden stretching of the abdominal walls relieves the pressure on aorta and cava, obviously more on the more rigid aorta. Blood thus is permitted to rush through to the lower half of the body, but without the possibility of its return, and then the final effect is a sudden and very undesirable passive hyperemia with an exaggeration of the hemorrhage. In the same manner an occasional failure of constriction can be explained when the bandage is applied not tight enough. The arterial blood will pass under it but the venous return flow may be obstructed.

On the other hand, the obstetrician will be more concerned with the possible harmful effect of belt constriction upon the kidneys as described by Hoehne. He observed that there was no urine passing down into the bladder during the constriction, and that the first urine obtained after the removal of the belt contained albumen. The temporary compression of both ureters undoubtedly affects the kidneys and the possibility of serious damage during a long constriction should be taken into consideration. Hoehne in this paper, suggests a method of constricting only one ureter by means of the Momburg belt for the purpose of examining the urine coming from the other kidney.

Hoehne also attempted to interrupt a pregnancy by means of belt constriction. He failed. His intention was to asphyxiate the fetus. Most writers also emphasize the peculiar fact that the constriction, with comparatively rare exceptions, causes strong uterine contractions, thus adding an important factor in the control of post-partum hemorrhage. Weber applied the belt in cases of profuse hemorrhages due to a retained placenta, and saw the placenta expelled spontaneously within 15 minutes without any further loss of blood. If necessary, in such cases of atonic hemorrhages, during the constriction, the placenta can be removed manually without hemorrhage. At times, however, a firm contraction of the uterus occurs only when the belt is removed.

The belt has proved extremely satisfactory, according to a report of Seitz, in 15 cases of placenta previa treated by means of vaginal hysterotomy. All mothers recovered and of the 10 children living at the time of operation 9 were saved. In his belief these splendid results are due to the fact that the belt permits a slow and careful operation. Sigwart thinks that vaginal Cæsarean section for placenta previa has been abandoned on account of the danger of serious hemorrhage. This danger now is safely obviated by the use of the constricting belt. He performed the operation twice successfully for placenta previa.

A paper of Ilmer enumerates the various conditions in which Momburg's belt has been used more or less successfully by obstetricians and gynecologists. Thus this method has been employed in a case of severe hemorrhage after a vaginal myomectomy, also after another vaginal operation when a ligature had slipped off a stump. Mackenrodt made one

of his radical abdominal hysterectomies for uterine cancer under constriction with satisfactory result. The belt has been extensively used in various forms of atonic hemorrhage after delivery. In cases of deep cervical tears constriction not only checked at once the hemorrhage, but permitted careful preparation for a suture of the tear, which can be done especially satisfactorily during this stage of local anemia. In other hemorrhages time can be gained for other measures, *e. g.*, for proper preparations for intra-uterine douche or packing; for thorough disinfection of patient and operator; or for a safe transport of the patient to a hospital. The belt may prove lifesaving in a case of premature detachment of the placenta, and will facilitate the management of cases of placenta previa. Immediate extraction after version is desirable in the interest of the child, but usually is omitted for fear of a cervical tear. The belt, as pointed out, greatly eliminates the danger of the cervical tear. The belt, as already mentioned, renders vaginal Cæsarean section comparatively safe for cases of placenta previa. The belt has been used in uterine rupture and in instances of serious hemorrhages due to hemophilia. In patients suffering from valvular lesions the belt applied immediately after the expulsion of the fetus will compensate the sudden, dangerous fall of the intra-abdominal pressure. Liepman has resorted to Mom-burg's belt in a case of excessive anemia after placenta previa, for the purpose of an autotransfusion while getting ready for a hypodermoclysis. The lower extremities were bandaged from the toes up, and then the belt applied to supply temporarily the heart with a sufficient amount of blood.

The method of waistline constriction in the light of all recent literature is one of the most advantageous and effective therapeutic measures at the disposal of the obstetrician, when dealing with serious hemorrhages. Its procedure is simple, its effect prompt,—the two main advantages in obstetrical work. Even if the effect is only temporary, sufficient time can be gained for the careful preparation of other means of controlling a hemorrhage. The obstetrical patient offers unusually favorable conditions for the procedure: her abdominal wall is relaxed, her more or less anemic condition usually eliminates the danger of the sudden rise of blood-pressure incident to constriction. Frankl's investigations of this particular feature of belt constriction promise to preclude any disastrous effects at least in obstetrical practice. The method can and should be used by the general practitioner, but not indiscriminately. It is not free from dangers; these dangers, however, will count naught in those desperate obstetrical hemorrhages in which the belt offers the one reliable and ready means of checking the flow of blood promptly before life is extinct.

TREATMENT OF PROSTATIC HYPERTROPHY.

A REVIEW OF RECENT LITERATURE.

By JOHN R. CAULK, M. D., of the Editorial Staff.

1. Alexander: Prostatectomy. (*New York Med. Journ.*, February 8th, 1896.)
2. Belfield: Operations on the Enlarged Prostate. (*Amer. Jour. of Med. Sciences*, Vol. 100, November, 1890.)
3. Bottini: Galvano-Cautery Operation. (*Archiv. fuer klin. Chir.*, Vol. XXI., p. 1, 1877.)
4. Freudenberg: Die Chirurgische Behandlung der Prostata Hypertrophie. (*Wiener Klinik*, 1907.)
5. Freyer: Total Extirpation of the Prostate for Radical Cure of Enlargement of that Organ. (*British Med. Journ.*, July 20th, 1901.)
6. Fuller: The Question of Priority in the Adoption of the Method of Total Enucleation, Suprapubically of the Hypertrophied Prostate. (*Annals of Surgery*, Vol. 12, 1905.)
7. Goodfellow: Median Perineal Prostatectomy. (*Journ. Amer. Med. Assoc.*, Vol. 2, p. 104, 1904.)
8. White: Castration. (*Trans. Amer. Surg. Assoc.*, Vol. 22, p. 130, 1903.)
9. Young: A New Combined Electro-Cautery Incisor for the Bottini Operation for Prostatic Obstruction. (*Journ. Amer. Med. Assoc.*, January 11th, 1902.)
10. Young: Conservative Perineal Prostatectomy. (*Journ. Amer. Med. Assoc.*, Vol. 2, 1903.)
11. Young: Prostatic Median Bar Excisor. (*Trans. Amer. Assoc., of Genito-Urinary Surgeons*, 1909.)

Literature at present pulsates under hypertension from the numerous articles which have been injected into it for the treatment of prostatic hypertrophy. Even as far back as 1905 Socin collected 1,200 articles written on this subject. Since then many others have appeared. There is probably no other subject in surgery which has received more attention and no surgical malady which has shown greater advances in its treatment.

The treatment may be classified as palliative and radical. Under palliative are included prostatic massage, dilatations and catheterism. The radical comprises the various operative procedures which have been proposed.

Prostatic massage is often of benefit for a time in beginning hypertrophies if associated with some chronic prostatitis, but sooner or later it will fail and other measures will be necessary. Dilatations of the urethra have been abandoned as they generally aggravate the condition, and, instead

of being a benefit, prove harmful. This type of case should be carefully watched and not allowed to develop conditions which will add to the gravity of an operation.

Catheter life, which was unfortunately about the only resort of our ancestors, and which we are sorry to say is still advised by some practitioners,—just why, no one seems to know,—should not in the light of our brilliant operative results be recommended except under certain limited conditions, the principal one being as a preliminary measure to prostatectomy. Its use in this respect cannot be too strongly urged as it has been the life-saver to a great number of patients, and has put prostatectomy on a much safer foundation.

As to a permanent catheter life, except in patients who are absolutely unable to stand an operation, and they are very few, we should avoid it. The patients are sure to develop a cystitis, no matter how scrupulously cleanly and aseptic is our technique. Then catheterization becomes frequent, painful and an incessant nuisance to the patient, causing trauma to the urethra, susceptibility to vesical calculus and great liability to the infection of the kidneys with its resulting seriousness. At best, these patients are very miserable and are constantly hampered by the awful presence of the catheter. Furthermore, the duration of a catheter life is not long and then the mortality is higher than prostatectomy. Rosving reports ten deaths in 126 cases treated by catheter life. The best catheter to use in cases of prostatic obstruction is the coudeé (Porgès). A straight soft rubber catheter should not be used, as it usually butts against the obstruction and causes traumatism; and occurrence that often explains the urethral chills that follow catheterization.

The surgical measures dealing with prostatic hypertrophy have been very numerous but at present it is generally a question either of the perineal or the suprapubic prostatectomy.

In 1856 Mercier first removed a prostatic middle lobe through the perineum. Billroth in 1867 did the first radical removal of the prostate, then in 1876 Bottini introduced his galvano-cautery operation through the urethra. Belfield was the first to do a suprapubic prostatectomy in 1866. Goodfellow in 1890 began the first well-systemized removal of the gland through the perineum. White in 1893 proposed castration and in the same year Reginald Harrison brought forward vasectomy. Of the early operations, the one of Bottini was the most important.

The technique of the operation is more or less familiar to all and will not be described. The instruments have been modified and improved. Freudenberg's instrument has been most generally used and has been modified by Young, in order to have different-sized blades according to the size of the prostate. Chetwood's instrument is designed to operate through the perineum instead of the urethra. The Bottini operation has found its best field in the cases of medium bar formation, sclerotic prostates, the so-called contracture of the neck of the bladder. In large intravesical hypertrophies, the results have not been as satisfactory. The prostate continues to grow, the obstruction soon returns. The dangers of the operation are considerable. It is more or less a blind procedure; and the danger of burning in the rectum, of the blade slipping into the urethra, particularly the old style with the obtuse angle, coupled with the high mortality, have relegated the operation to the rear.

Castration spread like a pandemic of la grippe for a time, but the results were not encouraging and the mortality unfortunately high. Vasectomy has never won popularity.

Suprapubic Prostatectomy.—In 1827 Amussat, during an operation for vesical calculus, removed a portion of the prostate suprapubically. In 1885 Dittel carried it out as a routine for prostatic obstruction, but the first definite suprapubic prostatectomy was done by Belfield in 1886 and in the next year McGill followed along the same line.

The first complete suprapubic prostatectomy was done in 1894 by Eugene Fuller, although Freyer is wrongly considered by many to have been the first. He has perfected the operation and has always been the representative of this method. At first the operation of Fuller was done without the aid of the fingers in the rectum, the prostate being pressed up by the fist against the perineum. The modification of the operation by putting the fingers in the rectum was brought out by Guiteras in 1900, and it has greatly assisted in improving the operation. Fuller's operation consisted also in supplying perineal drainage and closing the suprapubic incision. Freyer, who drains suprapubically with a large $\frac{7}{8}$ -inch tube, does not pack the prostatic cavity and does not suture the bladder. Deaver, a great advocate of the suprapubic method, opens the bladder widely to expose the interior, uses a smaller drainage tube, usually packs the prostatic cavity with gauze, and sutures the margins of the mucous membrane around the cavity over the packing. He says that the ejaculatory ducts and urethra are almost always torn. The suprapubic operation is an excellent operation and is very popular with many operators. It is an operation that is done more or less blindly, as the prostatic cavity has to be drained uphill through the bladder which is often infected; and the patients are required to stay in bed longer than after the perineal method, thereby running the danger of a hypostatic pneumonia, and as a rule retarding their progress in gaining strength after the operation. The ejaculatory ducts and urethra are liable to be injured and the mortality, according to Freyer's statistics which are the best, is 7.5 per cent.

Perineal Prostatectomy.—Many references among the early literature are made of the removal of the prostate, or parts of the prostate through the perineum. Covillard in 1639 was one of the first to remove a hypertrophied middle lobe during the course of a perineal lithotomy. Billroth in 1857 was the first to remove intentionally the prostate through the perineum. Goodfellow was the first to make the operation a success. He used a median perineal incision and exerted counterpressure suprapubically. In 1896 Alexander advocated suprapubic incision to push the prostate down toward the perineum to assist in its enucleation. In 1899 Bryson suggested cutting down to the bladder but not opening it, and pushing the prostate down from above. Then came the making of perineal operation, which consisted in getting something in the urethra or bladder in order to exert traction and pull the prostate down. It started with the rubber balloon of Syms, the desenclaveurs of Delbet and Albarran, and later with the tractors of Young and Lydston. The instrument of Young is the one almost entirely used in this country.

The perineal operation through median incision and without a tractor was a blind operation, uncertain in its results and dangerous in its complication. In 1903, Young brought out his method of conservative perineal prostatectomy, and through him, it has been greatly perfected. Instead of being an operation with a high mortality and many complications it has become one of an exceedingly low mortality and practically no serious complications. In his last report of 400 cases—patients varying in age from fifty to eighty-eight—the majority were in the hospital under

four weeks after the operation: 1 only six days, 8 under two weeks. The fistula closed as follows:—

22 per cent. within two weeks; 50 per cent. in 21 days; 8 cases within a week, and two cases on the fourth day. Practically all these cases were out of bed and walking on the third day, tubes and gauze having been removed on the second. As to the functional results, in answers to letters sent to the patients, 85 per cent. replied that they had been absolutely cured, the remainder, with a very few exceptions, stated that they were greatly improved. There were but 2 cases incontinence following the operation, and the operations on these two were atypical. One was a very old man, greatly depleted, on whom a previous suprapubic operation had been attempted, and the operator would not remove the prostate on account of its great size. The perineal operation was done very hurriedly and the usual care was not observed. This patient was able to retain his urine while lying down and did not wet his bed, but on moving about there was dribbling. The second case during the manipulation had the ejaculatory bridge and urethra torn, the lateral lobes were removed separately, the median lobe was removed after dividing the urethra transversely just in front of the median lobe and stripping it up anteriorally and posteriorally. The prostatic orifice was greatly dilated and irregular, and was sutured around the tube with catgut. This patient does not wet his bed and occasionally can hold his urine all night, but dribbles at times when on his feet. Often, however, he can hold his urine four hours, so if one is careful to preserve the floor of the urethra and is painstaking in the removal of the gland, incontinence should be a rare complication.

The writer recently saw an article in a journal in which a surgeon said he had never seen the ejaculatory ducts and the urethra preserved. This is surely not in accordance with the best statistics of perineal prostatectomy.

There was only one case with a persistent recto-urethral fistula, several rectal injuries having been made during the operation but these were properly cared for and healed. If the rectum should be injured, a suprapubic drainage should be done to divert the stream.

As to the effects of perineal prostatectomy on the sexual powers, the writer sent, under Dr. Young's instructions, letters to all the cases, and their answers were most encouraging. Of 76 patients who had had normal erections and intercourse before operation, 39 answered that they were perfectly normal afterward. 5 had normal erections but had not attempted intercourse; in 10 the erections were impaired, but fairly satisfactory; in 9 erections were impaired and coitus impossible; in 13 erections had not returned. The cases that had impaired erections before operation showed about the same post-operative results as above. Of the cases that could not have coitus, on account of imperfect erections prior to the operation, one has a return of normal erections and indulges satisfactorily in intercourse. 48 cases had complete loss of sexual power before operation; of these, 2 have had normal erections since; 8 have had partial erections; in 38, erections have not returned. The percentage of mortality of these cases is 3.2. The causes of death were variable, pneumonia, myocarditis, apoplexy, pyonephrosis, spinal cord lesions, acute edema of the lungs, and secondary suprapubic for stone, etc.

The success of these cases other than a skilled operation is due to a preliminary preparation, such as getting the kidneys in good shape and building the patient up generally, and proper attention after operation,

which consists in continuous irrigation for twenty-four hours, abundance of water, infusion immediately after operation, careful attention to the bowels, never using enemas (two cases of pulmonary embolism followed the use of an enema), getting the patient up and moving about soon, and not tampering with the urethra. Sounds should not be passed, stricture being the rarest sort of a complication.

In 1909, before the American Association of Genito-Urinary Surgeons, Young presented two new instruments for the treatment of early hypertrophies—the median bar excisor and the operative cystoscope. The former has its special field of usefulness in median bar formation, vesical neck contractures, but should not be used where there is any lateral involvement. The latter has an occasional service in pedunculated middle lobes. The results of these operations in cases with median bars associated with small amounts of residual urine, increased frequency of urination, some difficulty and hesitancy,—in other words, signs of beginning obstruction, have been most encouraging and have saved numbers of patients from major operations. The operation can be done under local anesthesia. It is best for the patient to lie up for about a week, and for the first twenty-four hours to have a continuous irrigation in order to prevent clotting and to check hemorrhage, which is sometimes brisk but never alarming.

In all cases of prostatic obstruction, a preliminary cystoscopic examination should be done in order to determine the true condition of affairs. It is particularly essential in these cases, because the operation is useless and harmful if there is any lateral involvement.

RECENT TENDENCIES IN OPHTHALMIC THERAPY.

A REVIEW OF RECENT LITERATURE.

By JOHN GREEN, JR., M. D., of the Editorial Staff.

1. Daxenberger: Collargol in the Treatment of Eye Diseases. (*Wochenschr. f. Ther. u. Hyg. d. Aug.*, June 23d, 1910.)
2. Bondi: The Therapeutic Value of Sophol. (*Zeitschr. f. Augenheilk.*, June, 1909.)
3. Davis: The Treatment of the Eye when the Globe is Infected with the Object of Preventing Panophthalmitis. (*Trans. Amer. Ophthal. Soc.*, Vol. XII., Part I., 1909.)
4. Fukala: A Method of Rendering the Eyeball Completely Anesthetic in Cataract and Glaucoma Operations. (*Canada Lancet*, May, 1910.)
5. Farnarier: Acoin Oil as an Analgesic in the Treatment of Trachoma. (*La Clinique Ophtalm.*, April 10th, 1910.)
6. Ewing: A Useful Mild Caustic: A Relief, Possibly a Cure for Some Forms of Cancer. (*Amer. Jour. Ophthal.*, November, 1909.)
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8. Gemmill: Rodent Ulcer Treated by Potassium Bichromate. (*Brit. Med. Jour.*, October 23d, 1909.)
9. Cecchetto: Picric Acid in the Treatment of Ulcus Serpens. (*Annali di Ottalmologia*, Vol. XXXVIII., fasc. 8-10.)
10. Rampoldi: The Therapeutic Action of Jequirity in Some Cases of Cancer. (*Annali di Ottalmologia*, Vol. XXXVI., fasc. 3-4.)
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12. Arens: On the Treatment of Ulcus Serpens by Pyocyanase. (*Wochenschr. f. Ther. u. Hyg. d. Aug.*, October, 1909.)
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14. Jadin: On the Use of Thiosinamine in Some Diseases of the Optic Nerve and Retina. (*Zeitschr. f. Augenheilk.*, September, 1909.)
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17. Davidson: Radium and Some of its Physical Properties. (*Bristol Medico-Chir. Jour.*, March, 1910.)
18. Wirtz: Further Clinical Experience with the Ionization Treatment of Eye Diseases. (*Klin. Monatsbl. f. Augenheilk.*, July, 1909.)

19. Zahn: Experimental and Clinical Experiences with Ionic Medication. (*Klin. Monatsbl. f. Augenheilk.*, January, 1910.)
20. Orloff: Bier's Method in the Treatment of Spring Catarrh. (*La Clinique Ophtalm.*, November 10th, 1909.)
21. Perlman: On the Employment of Steam in Ophthalmology. (*Klin. Monatsbl. f. Augenheilk.*, May-June, 1910.)
22. Hesse: Eyebaths. (*Wochenschr. f. Ther. u. Hyg. d. Aug.*, February 3rd, 1910.)
23. Thomas and Fisher: Relief of Glaucoma Through Subconjunctival Injections of Sodium Citrate. (*Annals of Ophthalm.*, January 1st, 1910.)
24. Heller: Three Cases of Acute Glaucoma Treated with Subconjunctival Injections of Sodium Citrate. (*Annals of Ophthalm.*, October, 1910.)
25. Happe: On the Supposed Tension Lowering Action of Subconjunctival Injections of Sodium Citrate in Glaucoma. (*Arch. f. Vergleichende Ophtalm.*, Br. 1, Heft. 3, 1910.)
26. Klinedinst: Varix of the Orbit Cured by Alcohol Injections. (*Ophtalm. Record*, January, 1910.)
27. Wandless: Mydriatics and Miotics in Injuries of the Lens. (*Arch. of Ophtalm.*, May, 1910.)
28. Harman and Morton: The Use of Carbon Dioxide Snow in Eye-Work. (*Brit. Med. Jour.*, October 29th, 1910.)
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32. Bonsignorio: A Substitute for Dionin. (*Bull. gén. de Thérapeutique*, December 15th, 1909.)
33. Dor: The Treatment of Retinal Detachment by Tuberculin. (*La Clinique Ophtalm.*, August 10th, 1910.)
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The purpose of the present paper is to present to the practitioner a review of recent additions to the therapeutic equipment of the ophthalmologist and new applications of existing ophthalmic drugs and therapeutic methods. The editor has surveyed the literature of ophthalmic therapeutics of the past twelve months and has tried to select for review only such suggestions as seemed to be of value. For the sake of ready reference, the name of the drug or method is indicated in a subhead.

Collargol.—Daxenberger's experience with this silver preparation has been altogether favorable. Its efficacy in inflammatory diseases of the anterior segment is well known, *e. g.*, severe conjunctivitis, dacryocystitis, and *ulcus serpens*. After evacuation of hypopion in *ulcus serpens*, Daxenberger injects a few drops of a $\frac{1}{2}$ per cent. solution into the anterior chamber and also advocates an intravitreal injection (of the same strength) in all cases of impending panophthalmitis.

Sophol.—This albuminate contains 20 per cent. of silver in "masked" form; *i. e.*, it cannot be detected by the usual reagents. Bondi has found that in 5 per cent. to 10 per cent. solutions it is well borne by the tissues, has no cauterant action and is useful in superficial bacterial invasions.

Argyrol.—In four cases of impending panophthalmitis, Davis prevented the full development of the disease by injecting 10 to 20 per cent. argyrol into the anterior chamber after the evacuation of the pus.

Complete Anesthesia.—Dissatisfied with the degree of local anesthesia in cataract and glaucoma operations especially as regards the anesthesia of the iris, Fukala sought to find a means whereby the eyeball could be rendered completely insensitive. This result he has attained by the subconjunctival injection of a 15 per cent solution of cocaine, to which is added adrenaline. After 15 minutes the eyeball is completely insensitive. The method should not be used in children up to 15 years, in marasmus and in severe heart affections.

Acoin Oil.—To obviate the pain incident to the use of copper sulphate crayon in the treatment of trachomatous granulations, Farnarier applies a 1 per cent oily solution of acoin to the palpebral conjunctiva after the application of the crystal. The reviewer can warmly recommend this suggestion.

Salicylic Acid-Resorcin in Alcohol.—The formula recommended by Ewing consists essentially of resorcin 40 grains, salicylic acid, one ounce, dissolved in alcohol 95 per cent., four ounces. This he has used in pannus, fascicular and dendritic keratitis and ulcer serpens with much satisfaction. But it is mainly in lid epitheliomata that the solution seems to have its greatest use. Teased into the ulcerated surface of lid cancers it has been found to destroy all trace of the malignant tissue. After the surface has been thus cleaned, granulation tissue soon replaces the cancer and a smooth pliable scar forms. In the treatment of epithelial growths, Ewing directs that the solution should be applied to the surface on the end of a cotton wound tooth pick and teased into the surface until the capillaries become brown or black. This is repeated daily or every second day until all epithelial tissue is destroyed and the floor and margins of the ulcer are covered with normal healthy granulation tissue.

In the second report, Ewing relates experiences with the solution in inoperable cancer in other portions of the body in which it was found to have deodorizing and other beneficial effects. In three cases of perforating ulcer serpens, "good" corneas were saved. A thickened corneal staphyloma was destroyed in five applications leaving the cornea of nearly normal curvature.

Potassium Bichromate.—A 10 per cent. aqueous solution of potassium bichromate was used by Gemmill as an application to a rodent ulcer over the bony part of the nose. Three series of applications was followed by rapid healing leaving finally an irregular pitted scar.

Picric Acid.—Cecchetto confirms the good results obtained by Fortunati and Valenti from the use of a 2 per cent. picric acid ointment in eczematous blepharo-conjunctivitis, lime burns, traumatic keratitis and in particular, ulcer serpens. The microorganisms quickly disappear, hypopyon resorbs and healing occurs with the smallest possible scar.

Jequirity.—Small gelatine disks of jequirity prepared by Zambelletti have given Rampoldi good results in several cases of epithelioma of the face and eyelids.

Pyocyanase.—Pyocyanase, which is a brown fluid prepared from bouillon cultures of *B. pyocyaneus*, has been used by Bronner in 6 cases of hypopyon keratitis. A 50 per cent. solution dropped into the eye every hour is followed by prompt disappearance of pain. The ulcer is said to heal more quickly and with less opacity than when classical methods are used. Atropine and hot formentations were additional means of treatment.

A similar estimate of this preparation has been formed by Arens.

Fibrolysin.—Ophthalmic opinion seems to be utterly divided as to the usefulness of thiosinamine and fibrolysin in ophthalmic therapy. Cauvin reports two cases of long standing simple stricture of the nasal duct in which annoying lacrimation was greatly relieved. Wecker's hollow sound is introduced and allowed to remain fifteen minutes in *situ*. The duct is then flushed with water by means of a lachrymal syringe, the tip of which is inserted into the sound. The syringe is filled with 2 c.c. fibrolysin and the duct flushed therewith as the hollow probe is slowly withdrawn. One case was cured after two injections, the other after one. Both had failed to yield to a long course of probing.

Jadin made a special investigation into the possibilities of thiosinamine therapy in diseases of the optic nerve and retina. 30 to 40 injections in the back of a $\frac{1}{3}$ Pravaz syringe of a 10 per cent. solution of thiosinamine in water and glycerine were made on alternate days. Five cases of tabetic atrophy and eight cases of optic atrophy of unknown origin were either not benefited or made worse. Retinitis pigmentosa was unaffected and acute neuritis was made worse. The same was true of retrobulbar neuritis and retinitis proliferans.

Thillier relates a case of retinal hemorrhages, improving at first under mercury, but later relapsing so that vision was reduced to perception of large objects and the media were blocked. At this point 2 c.c. fibrolysin 0.10 per cent. solution was injected into the gluteal muscles. A second injection two days later, was followed in four days by such marked improvement that the patient was able to tell the time of a watch. After ten injections vision was $\frac{1}{6}$ and the fundus was visible. At the time the case history ends the vision had risen to $\frac{1}{3}$ with the future, as the author prudently remarks, "in doubt."

Radium.—Abbé, in the course of a general paper on the effect of radium in surgery relates the following experience of interest in connection with ophthalmology. A forty-five year-old male presented a sarcoma involving the lower lid and adjacent conjunctiva and skin. The tumor had resisted treatment with rays. Strong radium was applied four times in the course of a single week. Week by week the growth melted away and finally completely disappeared. No recurrence in five years. Well may Abbé remark: "Nothing so nearly resembling the marvelous has ever been my fortune to see in surgical work." Davidson uses radium bromide in sealed glass tubes, thus utilizing the *gamma*, most of the *beta* but none of the *alpha* rays. He reports favorable results (mostly definitive cures) in tuberculous verrucosa, recurrent carcinoma and rodent ulcer of the eyelid. In hypopion ulcer, corneal ulcers generally, episcleritis and pterygium, radium has, according to Davidson "yielded results superior to any other known form of treatment."

Ionization Treatment.—Wirtz, on the basis of a considerable clinical experience with ionization treatment, is favorably impressed with the results. He has used zinc electrolysis in the treatment of corneal ulcer due to pneumococci, diplobacilli, staphylococci, etc. The ions penetrate into the depths of the tissue and exert a powerful antiseptic action. The current used is 3 to 5 milliamperes, of three to five minutes duration given in from four to twelve sittings. In 10 cases of interstitial keratitis treatment with iodine ions yielded excellent results. Improvement was noted in 21 out of 26 cases of corneal opacity treated by chlorine ionization. A bad case of syphilitic iridocyclitis, vision reduced to p. l. and a case of scleritis of doubtful etiology yielded to mercury ionization. Zahn experimented with ionic medication in animals. He found that zinc is

a powerful caustic, destroying in mild doses the epithelium and in larger doses the deeper tissues of the cornea. The first results is a necrosis and shedding of the epithelium and thinning of the corneal tissue. Twenty-four hours later the epithelium has disappeared and the cornea is swollen and edematous. Chlorine and iodine possess only a superficial action. Zinc ionization was found to be highly beneficial in most cases of pneumococcal ulcer, diplobacillary, simple and dendritic ulcers and ulcerative blepharitis.

Bier's Hyperemia.—Orloff reports the cure of a case of vernal conjunctivitis by means of Bier's hyperemia induced by means of Noge's clamp forceps.

Steam.—Perlman declares that steam used according to his method, favorably influences nutrition, alleviates pain, promotes the formation of pus in virulent affections of the lids and lacrimal sac and prepares the conjunctiva in chronic catarrh for the energetic action of astringent collyria, at the same time diminishing their irritative effect. His apparatus allows steam to escape through two pipes, the mouths of which are funnel shaped and covered with wire netting. The patient approaches them as near as is possible without discomfort and keeps his eyes open or shut according to the disease or the required intensity of effect. Sitzings last ten to fifteen minutes and are repeated three to four times each day.

Eyebaths.—According to Hesse eyebaths, by which is meant douching of the open eye by means of a solution contained in an eyecup, cleanses, promotes lymphatic activity and has a special effect on bacteria. He uses a lukewarm solution of artificial Emser salt and baborate of soda.

Sodium Citrate.—The relief of glaucoma, or rather a reduction of increased tension in glaucoma by means of subconjunctival injections of a solution of sodium citrate is the proposal of Thomas and Fischer. The strength of the solution (the injection may be repeated) is 4.05 to 5.41 per cent. In the five cases reported the increased tension was lowered in every instance. Heller treated by this method three cases of acute glaucoma with strikingly favorable effect. For two hours following the injection the patient suffered an access of pain which then entirely disappeared coincident with a fall in tension. In one case, sight returned to what it was before the attack. Another effect commented upon by Heller is the marked deepening of the anterior chamber thereby simplifying the ultimate performance of iridectomy.

The method has found a most severe critic in Happe who declares that in a research of this kind the determination of the tension by finger testing is not sufficiently delicate. By using refined tonometric methods Happe obtained the following results: in 17 cases thus treated, there occurred a slight lowering of tension in 2, but not so much as is frequently observed following the instillation of eserine; in 3 non-glaucomatous eyes and in 2 with absolute glaucoma no effect was produced; in the remaining 10 the tension was raised, probably from the irritation of the ciliary body and hypersecretion.

Alcohol Injections.—In a case of varix of the orbit pushing forward the outer half of the right lower eyelid, in which electrolysis had been tried without effect, three drops of alcohol were injected into the orbit. This was repeated (dosage slightly increased) in a week and again in 2 weeks. One week later the venous tumor had disappeared. Klinedinst assumes that the treatment set up a mild cellulitis or periphlebitis followed by thrombophlebitis and organization of clots leading to the obliteration of veins.

Atropine and Eserine in Alternation.—A traumatic cataract with iritis under the influence of atropine and hot fomentations showed progressive

absorption for eight weeks so that vision with a plus 7 was 20/100, after which for seventeen days no further improvement took place. Alternate instillations of atropine and eserine were then employed, improvement began, and continued until vision became normal with a plus 12 lens. Wandless has also found the method of value after discissions and cataract extractions except when there is increased tension. Atropine should be given from one to three days four or five times daily, and then eserine instilled for one to three days or until the atropine is overcome.

Carbon Dioxide Snow.—For papilloma and rodent ulcer, Harman and Morton recommend one full application of the snow cylinder. For trachoma, brief and repeated applications have been found of service.

Serotherapy.—Deschamps report is based on the use of the Rosenthal-Berlioz antirheumatic serum in three cases of rheumatic iritis. 20 c.c. doses were injected on succeeding days followed by great improvement on the third day. But two of the patients developed serum rashes and the third became quite ill as an immediate consequence of the injection. The method appears to have only a limited application but may be used in addition to other methods of treatment.

Para Specific Serotherapy.—Whether or not we agree with the theoretical considerations advanced by Darier and others to explain the action of sera specific for one infection benefiting other infections of totally different origin, we must admit that clinical results seem to justify such a use. According to Verrey who has given, orally, dilute antidiphtheretic serum in cases of iritis, post operative infection and neuroretinitis, the results are excellent. Yvert attaches great merit to the method in acute infective iritis, and iridocyclitis whether due to rheumatism, tubercle, syphilis or traumatism. It may be used in addition to other methods in infective corneal ulcers, and in infected wounds of the cornea and sclerotic. The preferable method of administration is by the mouth. 10 c.c. of fresh serum mixed with milk is the usual dose. This may be repeated daily if necessary.

Acid Hydrobromate of Codein.—This drug, in a 2 per cent. aqueous solution has been found to have a profound lymphagogue action similar to dionin, but attended by less pain and chemosis. The effects disappear at the end of an hour.

Tuberculin in Retinal Detachment.—Dor has been led to use tuberculin in certain cases of retinal detachment on the assumption that the separation might be an initial and isolated manifestation of tubercle in patients who have no previous history of the disease. Dor reasons that, as non-vascularized or poorly vascularized tissue such as tendons, serous membranes, etc., are especially prone to tubercle, it is conceivable that the non-vascular vitreous may be thus attacked giving rise to shrinking of this tissue and consequent retinal detachment.

Five times in two years has Dor treated detachment with tuberculin (in addition to subconjunctival injections of sea water). Three cases were definitely cured while one had reattachment followed by relapse. As to the rôle played by the tuberculin, Dor asks the pertinent query, can anybody obtain reattachment four times out of five by subconjunctival injections alone?

Vaccine Treatment.—Using large doses (one hundred million gonococci), Shumway cured, in five weeks, a case of metastatic gonorrheal iritis and arthritis. Pain and photophobia disappeared after the first injection. Shumway states that in metastatic conditions the heterologous or stock vaccines are as efficacious as the homologous strain. The dosage varies from one to one hundred million, the larger doses being probably the best.

THE SURGERY OF CONGENITAL PYLORIC STENOSIS.

A REVIEW OF RECENT LITERATURE.

By MALVERN B. CLOPTON, M. D., of the Editorial Staff.

1. Berend and Winternetz: Pylorus Intubation for Spasmodic Stenosis of the Pylorus in Infants. (*Jahrb. fuer. Kinderheilkunde*, Vol. LXXII., No. 2, p. 230, 1910.)
2. Bunts: Infantile Hypertrophic Stenosis of the Pylorus. (*Trans. of Amer. Surg. Assoc.*, Vol. XXVI., p. 226, 1908.)
3. Hutchinson, R.: Congenital Pyloric Stenosis. (*Brit. Med. Jour.*, p. 102, October 8, 1910.)
4. Nicoll: Congenital Hypertrophic Stenosis of the Pylorus. (*Practitioner*, Vol. LXXXV., No. 5, p. 659, 1910.)
5. Scudder: Congenital Stenosis of the Pylorus. (*Surg. Gyn. and Obst.*, Vol. XXI., No. 3, p. 275, 1910.)
6. Stillman: Hypertrophic Stenosis of the Pylorus in Infants. (*Jour. Amer. Med. Assoc.*, 1909.)

There have been numerous reports of isolated operative cases of congenital pyloric stenosis in the recent literature, which have a certain value, but they fail to make clear the treatment of this much-discussed subject, and lack the weight of argument that will settle the question of the proper method to pursue in this condition. Hutchinson, who relates his large experience with this disease, may be assumed as typifying the best of the medical opinions of a condition that is lately being much more frequently recognized; and a short review of his address may be a proper introduction to the subsequent reviews of the results which the operative interference has given in the hands of those who have seen the class of cases not benefited by strictly dietetic measures. It is curious that 80 per cent. of the cases are males, and a large proportion are first-born children. The vomiting, projectile in character, usually coming on soon after a feeding, does not make its appearance until after the second week, and there is a tendency to cease vomiting for some hours with any change of food, but it recurs again as violently as ever. At the outset, the vomiting is accompanied by constipation, which helps to distinguish it from dyspeptic vomiting in which diarrhea is usually present. The child loses weight, it becomes emaciated; the wasting, however, is not like that met in cachexia. The child is not anemic, but simply looks starved, and remains surprisingly bright in spite of it. The physical signs are a dilated stomach, which makes a swelling in the upper abdomen in striking contrast to the attenuation of the rest of the trunk. Waves of peristalsis are seen shortly after a feeding, and roll from left to right about the size of a golf ball, sometimes two or three being seen at once, and there is practically no pain. A pyloric tumor can sometimes be felt. The pathological features are an enormous development of the whole

pyloric canal, which forms a dense tube, the extremity of which (the tumor-like pylorus) projects into the duodenum. The mucous membrane is thrown into longitudinal folds, the ends of which project into the vestibule. Microscopically there is an increase in the number of fibres, and also each individual muscle fibre is broader, both in the longitudinal as well as in the circular layers. He believes that there are great difficulties in the way of accepting either the congenital hyperplasia or the spasm theory, whilst the compromise that there are both hyperplasia and spasm, has the difficulties of both combined. The prognosis in these cases he bases on his own observation of 20 cases, 17 of which were treated at home and all recovered without operation, 3 sent to the hospital where 2 died. He gives Huebner's record of 19 recoveries out of 21 cases treated medically, Stark's 11 out of 12, whilst of 6 cases reported by Block and not operated upon, all did well, and of Bendix's there were no fewer than 30 recoveries out of 32 cases treated by medical measures alone. His own cases are indisputable, as shown by reference to the clinical histories. In the hospital which he attends and where medical treatment only is followed, the mortality was 78 per cent. in a series of 64 cases. This great increase in the death-rate was due to the fact that the cases come in late when much exhausted, and that these babies seem to stand the condition of hospital life badly. Of the operative statistics he mentions Burghard's 11 recoveries out of 16 cases, and Cautley's 6 recoveries out of 7 cases operated upon in private, but a mortality of 4 out of 5 hospital cases. The estimate of Ibrahim of 50 per cent. mortality in operative cases is accepted as about correct. Furthermore, he states that such statistics do not do justice to the surgeon, for in many instances operations were only performed as a last resort, when the chances of recovery were small. In dietetic treatment lavage is necessary once or twice a day, according to the frequency of the vomiting. Peptonized diluted cow's milk, not necessarily fat free is used; 2 or 3 ounces being given at a feeding. Vomiting will stop soon, but the infant may not gain in weight for weeks, sometimes not until the fifth month. It is at this period that one's faith in the efficacy of the treatment is most sorely tried. Improvement finally sets in, and often quite suddenly the child gains in weight. In hospital cases, in spite of the cessation of vomiting and the consumption of a fair amount of food, the weight refuses to rise, and the child succumbs to an "alimentary toxemia." The ultimate result of medical treatment has been observed in some cases five years after treatment, and the children were found perfectly normal and healthy. Some cases show evidence of obstruction, peristalsis and dilated stomach years later, and these cases have occasional stomach upsets. His position about operation is that it should never be recommended, although he believes that there may be some cases which would have been saved by operation that die without it, but he knows no method by which such cases can be recognized. It is suggested as a practical policy either to operate upon all cases in which the signs are well marked or upon none at all, for if you wait for five or six weeks to see if improvement will occur, the surgeon is called in when success is not likely, on account of the weakened condition.

Bunts considers congenital stenosis and infantile stenosis of decidedly different clinical significance. Congenital pyloric stenosis would in all cases call for very early operative interference. Infantile pyloric stenosis develops after birth and is often amenable to medical treatment, but in the absence of improvement an early operation offers an excellent prospect

of recovery. However, there does not seem to be as yet any positive way to distinguish between congenital and infantile forms. The earlier the symptoms the more probable the congenital form. In selecting cases pyloroplasty offers results superior to those of gastro-enterostomy and should be the operation of choice.

There has been no recent improvement in operative results, and the one great determining cause of death in practically all cases is delay. It is obvious that until this obstacle is removed by the medical attendant, little or no improvement of the present statistics can be effected.

In reviewing 114 cases Bunts found that the mortality figures were about the same as in the previous 89 cases reported by Thompson,—that is, that 53 per cent. of the cases died and this rate holds whether the operation was for divulsion, gastro-enterostomy or pyloroplasty. It seems surprising that an operation, seemingly so unsurgical in its methods and so unpromising as to its permanency as divulsion, should show the most favorable percentage of recoveries. This cannot be due alone to the smaller number of cases, for in this class we have 27 cases with a mortality of 51.8 per cent., while in pyloroplasty there are but 17 cases with a mortality of 53 per cent. There were 69 cases of gastro-enterostomy with 53 per cent. mortality. Aside from the inherent danger of operation upon the marasmic babes, the mortality from divulsion seems to have been due: first to failure to overcome the stenosis; secondly, to a rupture of the pylorus through the peritoneal coat; and thirdly, to hemorrhage. Pyloroplasty with a mortality slightly less than that of gastro-enterostomy would apparently be the operation of choice, and would accomplish in the safest, easiest, and most correct manner the relief sought. But this operation has been performed in but 17 cases. There must evidently be some other reason that the preconceived preference for gastro-enterostomy to account for the small number of pyloroplasty operations, and this reason seems to lie in the fact that operators have considered the hard, thickened, elongated, cartilaginous-feeling pylorus to be a barrier to its successful accomplishment. Dent has been an advocate of pyloroplasty, reporting 50 per cent. of recoveries in fourteen cases, and seems to consider the technical difficulties practically negligible. He uses a single row of Halsted sutures, which simplifies the operation very materially. Cautley is of the same opinion, and says that if the muscle is very thick and hard, a portion on each side can be snipped out before suturing. The reason that gastro-enterostomy has been performed more than four times as often as pyloroplasty and scarcely three times as often as divulsion, seems to be that most operators considered the chance of securing a successful result from pyloroplasty not very encouraging. The posterior method of gastro-enterostomy is more frequently used than the anterior, but it is suggested that the anastomosis can be made in front of the stomach with less handling of the tissues and with freer space for application of clamps, and with a better control over possible complications during the operation. The principal causes of death after pyloroplasty are marasmus and shock; while the causes of death after gastro-enterostomy are shock, convulsions, prolapse of gut and peritonitis.

Stillman reports on 27 cases which have been collected from the practice of physicians and surgeons along the Pacific Coast. Of these cases, 11 were operated on, of which 9 recovered. Of 16 treated medically, 9 recovered and 7 died. Of those recovering after operation all remained well and are healthy normal babies in appearance. Of those dying after operation, one died forty-eight hours after; the other after a second operation performed five days after the primary one, which was gastro-

duodenostomy and failed to relieve the vomiting. Of the 6 undoubted cases recovering under medical treatment, one at the age of five years is obliged to live on vegetable purees and milk meat-juice. One has been under treatment one month and ten days only. One at the age of five months weight $7\frac{1}{2}$ pounds. Operation has been considered in this case, but not advised because mortality risk. Of the remaining cases one at the age of six months weighs $13\frac{1}{2}$ pounds and one at seven months weighs $9\frac{3}{4}$ pounds. Of those dying under medical treatment, one died of pneumonia, one of sudden collapse three days of beginning treatment. The 11 cases treated surgically were operated on by several different surgeons. 7 of the cases operated had posterior gastro-enterostomy and one anterior. The case on which the gastro-duodenostomy was done would probably have recovered if originally the anastomosis had been made with the jejunum. Stillman believes that there is undoubtedly such a condition as pure pyloric spasm in infants as in adults, without demonstrable hypertrophy of the muscles. In these cases operation will do no good, as the spasm is apt to be secondary to trouble elsewhere in the abdomen and pelvis. The symptoms in these cases will begin after the first month and not start early as with true hypertrophy. He believes that the hard cartilaginous tumor will ultimately be found to be the result of congenital abnormality of development, and not the result of swallowing anything. This muscle tumor is capable of spasmodic contraction and the degree of spasm is not necessarily measured by the amount of hypertrophy. In two cases operated by Stillman no suggestion of lumen could be demonstrated by compressing the tumor. In four post-mortem specimens the same condition was noted, the lumen reduced to a tortuous passage one-half to three-quarters of an inch long, that would hardly admit a probe. He believes that a tumor should be made out in most cases before operation, particularly in those cases where an anesthetic is given.

Scudder in "The Study of the Effect of Gastro-Enterostomy upon Digestion and upon the Pyloric Tumor in Congenital Stenosis," gives a very complete article based upon his own experience and several other cases operated by others. He personally prefers a posterior gastro-enterostomy, and this is the operation which has been done in the cases he reports. 8 of the cases operated by him have been very carefully watched, 6 other cases are from other clinics. In every instance the pyloric tumor was palpated and inspected. Moreover, in every case the clinical course of the disease manifested itself as an obstruction at the pylorus and in all cases the baby was gradually starving to death. In considering the effect of gastro-enterostomy upon the metabolism of the body, he believes that in babies with congenital pyloric stenosis, ideal conditions are found for pursuing such an investigation. The object was to find whether or not the operation modified in any particular the digestion of fat, starch and protein. An elaborate system of experiments was determined on, and the facts bear evidence that the operation of gastro-enterostomy does not change the ultimate disposition of the food components, fat, starch, and protein, and clinically it is shown that all these babies without exception are thriving and in apparent perfect health, and that they have lived several years since the operation was done and have gained in weight, in height, and in every way seem well and happy. The investigation makes it clear that the alimentary canal has a power of adapting itself to the changed conditions of an obstructed pyloric outlet and the presence of a patent gastro-enterostomy stoma. The question of the persistence of the pyloric tumor after gastro-enterostomy is one of considerable importance. There is no doubt that for a while the gastro-enterostomy wound relieves the

acute starvation of the babies, but to determine the ultimate end of the condition, the x-ray was used to follow the course of food and in the various plates taken at different times after the operation up to five years, show that food passes through the stoma and not through the pylorus, which is interpreted as meaning that the tumor at least in the six cases of congenital stenosis examined, continued to obstruct after years of short circuiting. A case is also reported where at autopsy seven and one-half months after operation, death due to nothing connected with the stomach, the tumor persisted and showed microscopically as an hypertrophy of circular muscular fibers.* He gives in his work a complete history of all these cases.

Nicoll has to report nine cases seen within the past six months and they are used to emphasize the importance of recognizing two degrees of pyloric obstruction in infants,—that is, minor (“spasm”) to be treated by dieting and major (“hypertrophy”) for which early operation alone is curative. They all presented persistent vomiting and obstinate constipation, ravenous hunger, extreme ultimate emaciation and peristaltic waves passing over a dilated stomach. In five of the cases the obstruction was recognized to be of a minor degree and dietetic treatment decided upon and followed, at least up to the present, with complete success. Vomiting ceased, constipation disappeared, and weight steadily approached normal. For feeding he offers no rules; often the food which would appear to be ideally the worst, succeeds when many theoretically perfect foods fail. He believes that frequent changes in food are necessary if a particular food does not “stay down” after a three-day trial it should be abandoned for another. If after three weeks’ dieting, even in cases of apparent minor degree, vomiting still persists, dietetic treatment should be abandoned and the operation undertaken while strength remains. The patients were fed on a thin paste made by mixing flour which had been baked by the nurses, with milk. He believes that an undeservedly high reputation is given to diet treatment in these cases, and believes that this position is due to an erroneous diagnosis or a temporary improvement. Quite commonly vomiting can be kept in abeyance by systematic dieting to relapse even after many months. In the meantime the case may be demonstrated as a dietetic cure. A third reason for the frequent persistence in dietetic measures, is an exaggerated impression of the mortality attending operative treatment, and it seems that this erroneous idea is slow to yield to the proof of facts. Five of his cases out of six operated, recovered from the operation and were cured of the stenosis and all of these infants were treated as out-patients throughout before and after the operation. One case died of shock. He believes it essential to have an experienced operator and a medical advisor who brings resistant cases early and a nurse who is prepared to nurse the child “maternally” as well as “surgically.” He believes it wrong to keep the infants flat in bed and allow them to cry and in this way exhaust themselves, but if nursed in the arm they often sleep and conserve their strength. As to the operation of choice, he believes the last word has not been said as far as the cure of the stenosis undoubtedly the best procedure is a combination of either pyloroplasty (V. Y. method) or divulsion with posterior gastro-enterostomy. This last operation presupposes a fair amount of vigor and each case has to be judged on its merits, both in degree of stenosis found on exposing the stomach, and the condition of the infant’s health. The possible procedures open to the surgeons are combined gastro-enterostomy and pyloroplasty or divulsion, and this is probably the best operation, but can only be successfully performed on strong infants. Divulsion, which was the

method used in Nicoll's earlier cases, he considers the simplest of the operations. The stomach is opened on its anterior wall, a pair of dressing forceps pushed through the pylorus and forcibly opened till the peritoneal coat of pylorus tears widely. The gastric wound is sutured. The V. Y. pyloroplasty is peculiarly suitable, he believes, inasmuch as the great thickness of the muscular coat and the laxness of the submucous coat permit of the operation being done entirely "submucous," a point that has not been appreciated by some critics whose experience of the operation has probably been confined to the adult, or non-hypertrophied pylorus. Posterior gastro-enterostomy has a wide field of application. The addition to divulsion or pyloroplasty of gastrostomy by way of an opening in the anterior wall of the stomach, through which a rubber catheter is passed through the pylorus into the duodenum, the catheter being fastened by sutures to the skin wound, is often advisable. For some time Nicoll has not made use of this measure, having adopted in much emaciated infants appendicostomy in its stead. As an auxiliary measure, the author has found appendicostomy not only superior to gastrostomy, but also to continuous recto saline infusions. In young infants, as a rule, rectal saline infusion is impracticable.

Berend reports 2 cases in his own family with severe symptoms. In the first child the weight dropped from 3,050 grm. at birth to 1,800 in less than three weeks, and operative treatment became necessary. Loreta's divulsion was done; the hard contracted pylorus relaxed in the surgeon's hand during the operation, but it was still unusually thick although there was no trace of organic stenosis. The explosive vomiting continued as severe as before, the divulsion having evidently done no good, and the child growing constantly worse, the pylorus was incised and a catheter was introduced through the mouth and passed through the pylorus into the duodenum. By this means it proved possible to feed the infant and recovery soon followed, all trouble being over by the time the child was six weeks old; it is now three and a half years old and perfectly healthy. The disturbances in his second child were not so severe; the pylorus was never palpable and the syndrome disappeared under medical measure alone. The first symptoms in both cases were the uneasiness in nursing so that the children were unable to empty the breast, and the protuding stomach, this protusion of the stomach region and difficulty in nursing sustaining the assumption that the spasm of the pylorus is the primary disturbance. Peristalsis in the stomach was noticed four days later and the tumor, the size of a hazel-nut, in the pylorus region by the end of the week. He recognized the true trouble from the start and kept a detailed record of all the data, especially the amount of fluid ingested and vomited each day. Notwithstanding the severe derangement from the pylorospasm, the organism tenaciously maintained its normal water balance. He is inclined to ascribe the whole trouble to a lack of balance between the antrum and the musculature of the fundus of the stomach; when the innervation of both becomes normal then all disturbances from this source ceases. At birth there is neither spasmodic contraction nor hypertrophy of the pylorus, merely the predisposition. Winternitz discusses the cases from the surgical standpoint, calling attention to the extreme retraction of the muscular pyloric ring after the lengthwise incision, indicating excessive tonicity in the muscle. The pylorus was incised over the tube introduced from the mouth; this allowed ample nourishment from the first and the child began to gain at once. The retention pylorus catheter has proved successful in other cases in his hands, but he warns that it should not be left *in situ* longer than two days.

PRACTICAL MEMORANDA.

A department for the presentation of new or but little known points in diagnosis and differential diagnosis; therapeutic observations; special formulae; medical, surgical and laboratory technique; and new instruments and appliances.

AN EXACT METHOD OF OUTLINING THE LIVER.

The following procedure, first suggested to me by Dr. John D. Long, is useful not only in determining the size and position of the liver, but is applicable also to the spleen, heart, tumors of different sorts, etc. Place your stethoscope on the surface of the body about the centre of the area of liver dullness. Then strike a large tuning-fork against the iron bed or other convenient object, causing it to vibrate. Set the end of the handle of the fork on the surface of the body at a point beyond the border of the liver area, moving it carefully toward your stethoscope until the singing note of the fork is heard. In this way the organ may be outlined with almost mathematical exactness. It should be said that bone, of course, will also transmit the sound, so that in working down the back and chest the handle of the fork should not be placed on the ribs.

CREIGHTON WELLMAN, M. D., Oakland, Cal.

ON THE CHOICE OF A DRAIN.

In view of the fact that a large percentage of wounds require drainage, the choice of a drainage material is always an important one. The idea must be to secure material which will accomplish all that is necessary with the minimum of damage and of discomfort. The older drainage-tubes, whether of metal, hard rubber, or glass, have been used less and less as time has demonstrated the danger of pressure necrosis following their use. A glass tube was broken into a number of pieces in the abdomen of one of my patients and I am sure that one such experience is enough for any surgeon.

Soft rubber tubes probably possess all the virtues of those just mentioned and are less likely to do damage; hence, they have a well-deserved popularity. Some persist in using gauze, although it is pretty well shown that it does not drain to any great extent and becomes exceedingly foul, if left in the wound for any length of time. A combination of gauze and rubber or gutta-percha tissue in a form of the well-known cigarette drain is no doubt better than gauze alone, but in my opinion distinctly inferior to soft rubber used by itself. For a year or two I have used strips of rubber dam, or portions of worn out rubber gloves, to the practical exclusion of every other material in wounds, no matter where situated.

FOOTNOTE: These "Memoranda" are contributed to the INTERSTATE MEDICAL JOURNAL by the authors to whom they are credited.

Where it is possible, as in superficial lesions, these are used through and through, both ends being anchored to the skin. In abdominal work, such a drain is anchored to the stump of the appendix or the cystic duct by a strand of fine cat-gut, and the other end caught in an ordinary skin clip.

WILLARD BARTLETT, M. D., St. Louis.

A MODIFICATION OF ROSE'S ADHESIVE PLASTER BANDAGE.

In many cases of general visceral ptosis, the selection of an effective abdominal support is a very difficult matter. A modification of Rose's adhesive plaster bandage has given me much satisfaction, particularly in thin subjects where abdomens are so depressed that a serious obstacle is presented to the adjustment of a proper support to the displaced viscera. My modification consists in the use of narrow (two-inch) strips. The pubic hair is thus avoided, and much less surface is covered than by Rose's bandage. The patient is therefore more comfortable and enjoys more freedom of movement.

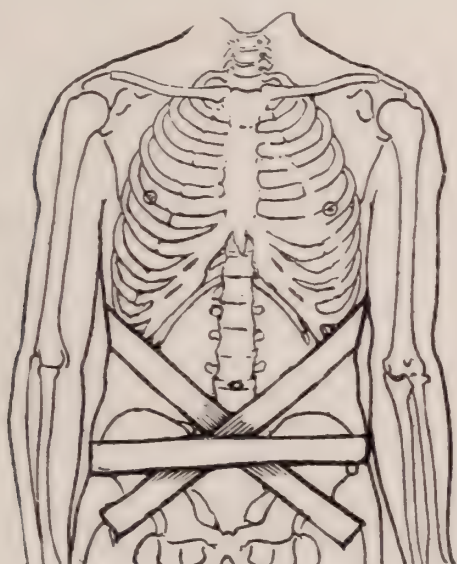


Fig. 1. Front View.

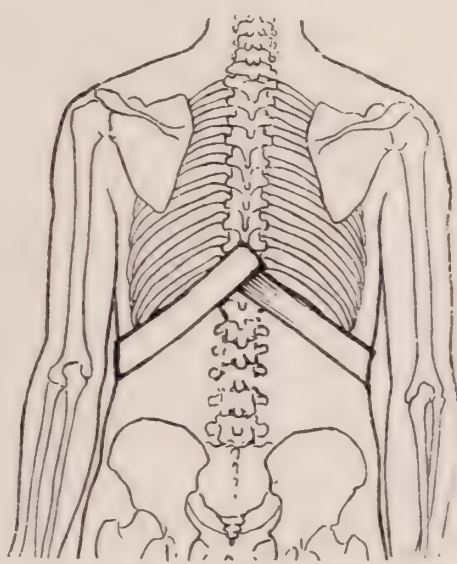


Fig. 2. Back View.

The method of applying the bandage is as follows:—The patient sits up on a couch, the adhesive strip is fastened to the dorsal vertebræ and follows the right lower rib margins; the patient now lies down, the lower abdominal contents are pushed upward with the operator's left hand while the bandage is carried across the abdomen and attached to the left side at Poupart's ligament. The patient again sits up and a second strip is applied to the other side in exactly the same way as the first one. Finally a third strip is attached across from one superior iliac spine to the other, the patient lying down.

The bandage can be worn comfortably for two weeks. Bathing is not interfered with. It is easily removed by gasoline and benzine, or, as Dr. E. J. G. Beardsley (*Jour. Amer. Med. Assoc.*, Vol. LVI., No. 4) has recently recommended, by oil of wintergreen. The bandage may be reapplied immediately, or in the event that irritation of the skin occurs, an interval of several days may elapse before replacing it.

HORACE W. SOPER, M. D., St. Louis.

A METHOD FOR DETERMINING THE SPECIFIC GRAVITY OF VERY SMALL QUANTITIES OF MOTHERS' MILK.

The analysis of human milk often becomes a matter of great importance in the adjusting of difficult feeding cases. By means of the small, reduced Babcock tester, which can be fitted to any ordinary centrifuge, it is possible to determine the fat content of human milk, less than 3 c.cm. of milk being required. If the fat content and the specific gravity of the milk be known, the proteid content can be very accurately estimated by means of the Richmond formula for the total solids. This formula reads as follows:—

Total solids = 6/5 of fat content in figures, plus last 2 figures of specific gravity divided by four, plus the decimal .14.

T. S. = 6/5 F. + $\frac{\text{sp. gr.}}{4}$ + .14.

Example. Fat content of a given specimen 4.5 per cent.
Specific gravity 1030.

T. S. = 6/5 of 4.5 + $\frac{30}{4}$ + .14 = 13.04.

The sugar content being assumed as constant at 6.5 and the salts constant at 0.2 we obtain the following figures:—

Total solids	13.04
Fat.	4.5
Sugar.	6.5
Salts. . . . .	.2
	<hr/>
	11.2

From which it will be evident that the proteid content of the supposed specimen would be 13.04 — 11.2 = 1.84 per cent.

The difficulty in carrying out the analysis lies in the fact that very often the mother is unable to express an amount large enough to enable the specific gravity to be taken.

For such cases the author has devised the following method which has proved absolutely satisfactory for a number of years:—

A mixture of chloroform and benzine (which are miscible in all proportions) is made and the specific gravity of the mixture determined. The chloroform being comparatively heavy and the benzine light, a mixture of any desired specific gravity can easily be obtained. The specific gravity of normal human milk varies from 1028 to 1031. A mixture having some such specific gravity being made, a drop of the milk to be tested is allowed to fall into the mixture. The drop in the mixture will retain its perfect contour. If the specific gravity of the milk be heavier than that of the mixture, the globule of milk will sink to the bottom of the vessel; if the milk be lighter than the mixture, it will float on its surface. By adding small quantities of either chloroform or benzine, the specific gravity of the mixture may be changed, until it is found that the drop is just *suspended* in the middle of the mixture. The specific gravity of the mixture will then represent the exact specific gravity of the milk. By this method, the specific gravity of even one drop of milk may be obtained and analysis of even a teaspoonful of mother's milk is possible.

It should be added that this method of estimating specific gravity is really the Haumarsten method for obtaining the specific gravity of the blood. By experiment, the author has found that the method is perfectly applicable to milk.

ALFRED FRIEDLANDER, M. D., Cincinnati.

THORACIC FLUOROSCOPY IN THE DIAGNOSIS OF MEDIAS-
TINAL AND SUBPHRENIC DISEASE.

There are many pathological processes in the mediastinal and subphrenic regions that defy clinical diagnosis. Very frequently the symptoms and signs based upon clinical and physical methods are so indefinite or so insufficient that an accurate recognition of the disease is impossible. It is in these conditions that the fluoroscope proves a most valuable aid to the other methods of diagnosis, and in many instances a fluoroscopic examination is absolutely essential towards the correct recognition of the diseased process. In thoracic examination it cannot be expected that observations made in one position will possess a high degree of accuracy. Owing to the relative position of the thoracic organs, it is most important to view the chest from as many angles as possible. It frequently happens that the shadows projected from a certain aspect of the chest appear entirely normal, whereas a slight change of position will manifest the presence of some abnormality which might have escaped detection. It is most important that the examiner acquaint himself with the variations of shadows in the different positions.

In the systematic examination of the thoracic region, the author places the subject in the following positions:—(1) Direct antero-posterior, with the screen placed against the anterior chest wall; (2) antero-posterior, with the screen in contact with the posterior wall; (3) oblique (antero- and postero-lateral) on right and left sides; and (4) antero-posterior or lateral recumbent. The antero-posterior position finds its greatest usefulness in lesions of the lungs, aortic arch, and diaphragm. Changes in the contour of the diaphragmatic shadows are of great value in differentiating pleural lesions from subphrenic abscess. In the oblique position there is normally a light area situated between the vertebræ and large vessels—the prevertebral space A. Small aneurysm of the aortic arch and a tumor in the superior mediastinum, both of which may be indiscernible in the antero-posterior position, obliterate the upper part of the light area and are thus recognized in the oblique position. In latent aneurysm of the descending aorta, which is covered in front by the cardiac shadow, there is frequently a loss of light in the lower part of this area. Chronic inflammatory conditions and empyema of the mediastinum usually darken the middle and lower portions of the prevertebral space.

WM. ENGELBACH, M. D., St. Louis.

PREPARATION OF BONE-WAX.

A convenient method of preparing bone-wax and putting it up so that it remains sterile and always ready for use, is as follows:—Eight drams of white wax are melted in an evaporating dish, over a low flame. When melted, one dram of oil of sweet almonds and one dram of salicylic acid are added and the mixture well stirred, brought up to a boil, and then poured into previously sterilized glass-tubes, about three-eighths of an inch in diameter and three inches long. These tubes should be filled with the mixture only for two-thirds of their length. The open end of the tube is sealed in a flame and the tube is well shaken while the mixture cools. The tube is filed at its middle, so that it can be easily broken when the wax is needed. The wax is extracted with a small bone curette.

M. G. SEELIG, M. D., St. Louis.

OBITER DICTA FROM FOREIGN JOURNALS.

RATS AND THE PLAGUE.

Medical men throughout the world have recently read, with more than usual interest, accounts of the outbreak of rat-plague in East Suffolk, England. That a similar invasion is highly probable at any time in various parts of the world should have a significance that must not be too lightly weighed by the medical profession. In the *Revue de Paris* of February 15th, is a lengthy article bearing on this subject by Dr. Norbert Lallié, and since what he says is really one of medical questions of the day, an excerpt may not be inadvisable. Dr. Lallié writes:—

On account of its migrations in all parts of the civilized world during the last two centuries, the rat is to-day the object of an antipathy that is well merited. It is true that the black rat (*Mus rattus*) existed in France even in the earliest times. But in spite of its undesirable qualities and its fecundity, its unpopularity was not matter for public complaint. The development of maritime commerce at the beginning of the fifteenth century, however, caused the brown rat (*Mus norvegicus*)—the migratory or sewer rat—to appear in Europe. Indigenous to China, or more probably to India and Persia, it invaded Europe by land and sea.

This hostile intrusion was favored in 1727, by a devastating famine which swept over India, and by the violent earthquakes which rocked Persia and the whole country around the Caspian Sea. Thereupon, the migratory rat set out in hordes toward the west, crossing the Volga, near Astrakhan. In 1731 it made its appearance in England, coming direct by sea from India. In 1750 the port of Odessa was invaded; thence, meridional and central Russia, the Balkans, Austria and the south of Prussia. Leaving the north of France, it soon got a foothold in Paris. Evidently the French capital was to its liking, for toward the end of the eighteenth century this species was swarming. The Government showing a disposition to transfer the charnel-house of Montfaucon to the suburbs of Paris, great was the outcry of the people in the neighborhood, for the dread was upon them that with the removal of this repository for dead animals, they themselves would be attacked by the famished rats! "It is the custom," says Bell, "to dump about thirty-five carcasses of horses daily into this place. The following day nothing remains but the bones." But the fear of the people was exaggerated, for by adroitly closing all the exits of the enclosure 16,000 rats were killed during the first month.

The migratory rat arrived in Sweden in 1790, in the south of Germany in 1800, in Switzerland in 1809. In spite of the rigors of winter it soon penetrated into the most northerly parts of Finland, where it is to-day quite as numerous as elsewhere. It has been in Denmark since 1790. For some time the sea passage, Limfjord, proved an obstacle to its advance into the northern portion of Jutland, but this was soon overcome as is

evidenced in the following anecdote. One night in autumn two fishermen, whilst seated in their boats, saw to their great surprise that they were completely encircled by a multitude of rats which were swimming with all their might toward the island of Thisted.

In 1735 English vessels brought the rat to North America and later to South America. But even until 1825 it remained in the vicinity of the Atlantic seaboard and, what should be noted, the regions around the Upper Missouri were free from it as late as 1870. In 1900, however, the migratory rat was at home in all parts of the United States and Canada, the restrictions in the latter country being only the excessively cold and icy districts in the extreme north.

A remarkable fact is that wherever the migratory rat has established itself, it has exterminated the black rat. Arthur Delisle, who has made a study of rats during the last forty years, says: "Almost everywhere in Europe, brown rats have driven the black rats away from the cities, and after this have pursued them into the open country and almost annihilated them. The vanquished species is no longer found in farm-houses, chateaux, or villages. If it has not as yet completely disappeared from all countries, the fault may be attributed to the slowness and sluggishness of its rival." This extermination of the black rat by the brown rat, in default of other proofs, would show that the latter is the stronger, the more voracious, the more redoubtable. The body of the black rat is 18 cm. in length; that of the brown is from 20 to 24 cm. The damage done by the former is insignificant compared with what is wrought by the latter. The black rat nourishes almost exclusively on vegetables; the brown is both carnivorous and herbivorous. It is of little importance to the latter whether the food is fresh or putrid. No other mammifer is so voracious, so omnivorous.

The brown rat acclimatizes itself equally well in all latitudes. The West Indies, the Azores, and Cape Verd Islands suffer from its ravages. It devastates coffee and sugar-cane plantations, banana and orange groves, as well as the fruit orchards in all countries.

Is it true, as has so often been mentioned, that the rats which multiply to excess devour each other? Bouffon was of this opinion. But the facts show that only when famished rats are confined to a cage do they resort to these desperate measures; otherwise, their ingenuity for procuring nourishment leaves nothing to be desired. In the Humber estuary, which lies between Yorkshire and Lincolnshire, England, there is an island of some 600 acres which for twenty years had yielded excellent pasture for many head of cattle. At present the rats are in possession of it, having traveled the distance of 450 metres which separates it from the opposite shore. They are so numerous that it is almost impossible to step anywhere without sinking into a hole. They have destroyed the crops and completely dissipated all signs of verdure. Attempts have been made to drive them away by inundating part of the island; but this procedure proved ineffective, for directly the water receded they quietly stole back from their retreat on the slopes, where they had tranquilly rested until such time as a return might be attended with safety.

Calmette, who is at the head of the Pasteur Institute at Lille, cites the following rather unusual incident. On the Scilly Islands, in the English Channel, the rats are so numerous, even on the islands uninhabited and deserted and on which only lichen, moss, and stunted brake grow, that one is justified in asking what their nourishment can possibly be. One day it occurred to an inquiring mind to dig the soil around one of the

burrows, when to his astonishment he found sixteen crabs. In another he came across no fewer than eight. They were all crabs of considerable proportions. They could not have reached the spot unassisted, for their claws were cut to the roots. The only explanation that could be arrived at was that the rats were in the habit of seizing the crabs in low water and before dragging them into their lairs maiming them by biting off their claws. The crabs when discovered showed every evidence of life and made a pitiful spectacle by the desperate manner in which they agitated their stumps.

Numerous anecdotes have been related which show that rats are not averse from attacking man. Nielson, in his book on Scandinavian fauna (1847), relates the incident of an old man who fell asleep on a haystack which the rats had undermined. Two days later a skeleton completely denuded of flesh was found. Stephenson, an English parliamentarian, reports a similar occurrence in a coal-mine near Killingworth. In this mine a number of horses were used. Now it happened that on festival days the horses and their fodder were brought up from the mine and the shaft temporarily closed. On this particular occasion the festivities lasted some twelve days. When the shaft was reopened the first man to descend was immediately assailed and devoured by a multitude of rats that had been deprived of nourishment during all this time. It is well known that young children have been attacked during sleep and severely wounded. Without dwelling at too great length on this gruesome subject, it would be well to add here that rats have a decided liking for fresh meat, and devour by preference pigeons, chickens and young ducks.

One cannot insist too much on the damage caused by the rat. This can be reckoned only with difficulty. Boelter, in his book entitled "The Rat Problem" (London, 1909) gives an account of his experiences with rats when caged. Each cage contained three brown rats, to each of which he gave daily a halfpenny's worth of food. In each cage he placed a small quantity of straw, hay, and rubbish; also a piece of brick or a bone so that the rodents could sharpen their teeth by nibbling. Their nourishment was that which they would have had had they been at liberty: bread, potatoes, carrots, turnips, cooked or raw meat, fish, eggs, poultry, and the debris from the table. Three rats in the same cage were alternately fed on vegetables or only meat, or received a mixed diet. The results were always the same. At the end of some days the rat that was least strong was found dead, partly devoured. A short time after, one of the survivors devoured the other. The last survivor was generally a female that in turn became heavy and dispirited and showed vivacity only when the quantity of food was increased. The rats examined after death were very emaciated; a fact which shows that a caged rat cannot live in a normal manner on a halfpenny's worth of food a day.

This expense is greatly increased by the damage done by the rat when at liberty. To ascertain an approximate estimate of what the damage really is, Boelter conceived the idea of sending thousands of letters throughout England, addressed to farmers, shopkeepers, grocers, *restaurateurs*, hotel-keepers, inspectors of docks and mines, sanitary officers, etc.; in short the principal sufferers from the rat. The questions pertained to what places were being invaded by the rat; the conditions which favor its increase; the value concerning damaged food commodities and all losses, whether animal or otherwise; the means of defense: traps, poison and bacterial preparations; the danger of using poisons;

the number of rats destroyed and the best means for their destruction; and, finally, the number of rats in a place as judged by the area and number of inhabitants.

The most important question was, Should the damage effected by the rat be valued at a farthing a day? Ninety-nine out of every hundred answers deemed this valuation about right; the minority thought it too low. One correspondent expressed the opinion that since the rat's depredations were so varied, an estimate could not be made. Added to this the rat exercises so much ingenuity in getting what it wants, that for mere man to judge its thieving acts, with any degree of correctness, he needs must be decidedly on the alert. La Fontaine puts this pertinently in the fable "The Two Rats" when he says: "While one rat clutches the egg and rolls and stumbles, the other seizes it with its tail and drags it off."

Nothing could be more exact. Other anecdotes have it that the rat has repeatedly been seen carrying eggs to a safe hiding-place under steps and porches, without the slightest break to mar the success of the expedition. But soft, alluring foods do not seem to appease altogether its destructive and predatory qualities, for it is well known that gas- and water-pipes have often fallen victims to its machinations. About the hardest material that a rat is known to have attacked is the billiard-ball, which, while en voyage from Uganda to England, was partly gnawed away by an omniverous rodent. Perhaps for all we know it may have regarded the particles of ivory as a new and refreshing *hors-d'œuvre*!

Our modern ships of vast proportions and great tonnage offer to hordes of rodents a refuge that is wellnigh perfect. Attempts have been made to show what the losses are in the matter of grain, flour, bacon, and cheese, during their transportation. It has been asserted that the daily loss due to each rodent amounts to nine centimes. On this basis what is not the annual loss in money! In the British Isles, for instance, the number of rats equals the population, which is some 40,000,000. In London alone there some 6,000,000 people, and calculating on the basis that the ravage done by each rat is even less than nine centimes a day, the figures approach the enormous sum of 375,000,000 francs annually. According to the Secretary of Agriculture in the United States the loss to that country is 500,000,000 francs, and in Germany we are told by the Minister of Agriculture, the estimate is 250,000,000 francs.

Truth to say, if the ravages wrought by the rat were limited only to material losses, there might be some excuse for the negligence in exterminating this rodent. It may be but right for man to divide the result of his toil with all animals. But the migratory rat is the propagator of contagious diseases.

In the front rank of these diseases the plague should be mentioned. In the Orient, as is known, this disease is endemic throughout the year. The number of deaths in India, according to statistics, was 1,204,194 in 1907, and 117,000 during the first eight months of 1908. A communication, read at the annual meeting of the British Incorporated Society for the Destruction of Vermin in 1907, contained the following warning: "The plague is at our doors; it has entered our ports, though it must be admitted that the vigilance of our sanitary officers has stopped its progress; but at any time our commerce may bring it to us, and what with our hordes of rats, there is no reason for the disease not to become epidemic. When once it has gained a foothold, its extirpation will be no easy matter." Dead rats infected with the plague were found in the London

docks in 1908, and had it not been for the energetic measures which were at once instituted, an epidemic might not have been averted.

The rat is easily attacked by the plague, and in countries where the laws are deplorably lax and poverty reigns, it is a matter of short duration before man gets the disease. How does the rat contract the plague? Evidently in the soil, where the plague bacilli remain for a considerable length of time in a weakened virulent state. The rat being peculiarly sensitive to the disease, it would seem that no matter how weak the virus is when it enters its body, directly this takes place the disease manifests itself in all its virulence. In 1898, Dr. Simond was sent by the Pasteur Institute to Bombay to study the disease. He discovered that the rats, even when they did not die, were excellent carriers of the plague in its chronic form. Thus it happens that even after the disease has entirely disappeared from a locality, the rodents may conserve it in a latent state.

The rat-flea, the intermediary between the rat and man in the propagation of the plague, can remain infectious from fifteen to eighteen days. One of ordinary size has a stomach half a cubic centimetre in dimension, which can contain five thousand plague germs.

Other diseases attributable to the rat are trypanosomiasis and trichinosis. Wherever there is an epidemic of trichinosis, a number of rats can be found affected with the disease. Swine are not averse from eating dead rodents or food contaminated by their excrement, and thus it can be easily understood how the eating of diseased pork carries the disease to man. The female trichina is most productive, since at the end of six or seven days it produces in the stomach of an infected hog some 1,500 embryos. These embryos attach themselves to the walls of the intestines and thence pass into the voluntary muscles. One hog can infect a number of people, as was instanced in Hadersleben, Germany, in 1865, when 337 inhabitants were stricken.

DIAGNOSTIC AND THERAPEUTIC NOTES.

THE TREATMENT OF POST-OPERATIVE ILEUS.—Kappis (*Muench. med. Wochenschr.*, 1911, No. 1). Westerman (*Zentralbl. f. Chir.*, 1910, No. 10). It has long been known that one of the indispensable procedures in the treatment of ileus, whatever the origin of the latter, is persistent gastric lavage. Westerman effectively replaces this by means of continuous gastric drainage. A long thin stomach tube, not too soft, such as is used in the forced feeding of the insane, is well lubricated and passed through one nostril, down the esophagus into the stomach. With a little persistence this can readily be accomplished. The tube is filled with water and, while full, its free end is immersed into a vessel partly full of water. Thereupon the latter is set down on the floor by the side of the bed. The siphonage begins at once, continues as long as the stomach contains fluid and begins again as soon as fluid enters the stomach. The latter is in this way kept continuously empty, not only to the great comfort of the patient but also to his objective improvement. Ructus, singultus and retching cease at once. The torturing restlessness disappears and the dangerous gastric distension is permanently relieved. An additional advantage is that the patient may drink water freely. The water is promptly evacuated through the tube, but the permission to drink freely adds greatly to the patient's comfort.

A SIMPLE TEST FOR BLOOD IN THE URINE.—Wackers (*Muench. med. Wochenschr.*, 1911, No. 4). While the detection of considerable amounts of blood in the urine is a simple matter, the test for traces is much more difficult and usually necessitates extraction with acetic acid and ether. A small amount of the urine (10 c.c. usually suffices), is filtered in the usual manner. Before the last few drops of urine have left the filter, a little acetic acid is added and then a mixture of tincture of guaiac and ozonized turpentine poured on. A blue color appears almost at once, if blood be present. This modification is far more sensitive than the original guaiac-turpentine method, even if the latter is used after extraction with ether. It is only in dilutions as high as one drop of blood to ten litres of urine that the test fails. Indeed, in certain cases its very sensitiveness may be a disadvantage. Practically the only source of error is the presence of pus in the urine. The latter, however, does not interfere if the urine be boiled for a moment before subjecting it to the test. In this case, however, it must be cooled before testing it, as hot urine will give a positive reaction even in the absence of blood.

TUBERCULIN TREATMENT IN CHILDHOOD.—Escherich (*Wien. med. Wochenschr.*, 1911, No. 1). Escherich considers it of the highest importance to diagnose tuberculosis in children as early as possible, best by

means of the biological tests, such as the cutaneous reaction, and to begin treatment by means of tuberculin injections at once. The mode of treatment, advised by him, differs radically in children and adults. For adults and for advanced cases in late childhood, he advocates the use of doses small at first but gradually increasing. This increases the local inflammation and aids the process of immunization. In young children, on the contrary, he advises the injection, for periods of two or three months, repeatedly of the same small dose, thus producing not an immunization but an anaphylactic process. This method is especially useful in the numerous cases of chronic juvenile tuberculosis, with slight or no demonstrable lesions, but evidenced by toxic manifestations and a positive cutaneous reaction. In apparently cured cases, this procedure seems to offer some guarantee against relapse. It presupposes the absence of severe anatomical lesions and a good state of general nutrition. The usual constitutional treatment is therefore not to be neglected. The good results of the method are often prompt and are evidenced by an improvement of the general condition, the appetite and the weight, a cessation of fever and nightsweats and a lessening of the cough.

THE ANTISEPTIC INFLUENCE OF MEDICAMENTS UPON THE BILE.—Knick and Ringsheim (*Deutsch. Arch. f. klin. Med.*, Vol. 101, Nos. 1 and 2). The writers have tested a great variety of drugs in regard to their antiseptic action, when administered internally, upon the contents of the gall-bladder. As might have been expected, the great bulk of these, such as calomel, salicylic acid and oil of turpentine were entirely inert. The drugs exerting the strongest antiseptic action were menthol and hippol (methylene-hippuric acid); urotropin was active only in much larger doses.

The writers' results, especially as regards menthol, are entirely in accord with our own experience. Of all the so-called intestinal antiseptics we have found menthol the only one worthy the name, if we except thymol in toxic doses. Menthol may conveniently be administered in a 40 per cent. solution in olive oil. Of this 10 to 20 drops may be given three times daily or oftener, best in double gelatine capsules. The latter precaution is essential as menthol produces an unpleasant burning sensation in pharynx and esophagus.

A REACTION IN THE URINE OF BREAST-FED CHILDREN.—Engel and Turnau (*Berl. klin. Wochenschr.*, 1911, No. 1). The urines of breast-fed and bottle babies may be distinguished by the following procedure:—To 10 c.c. add 1 c.c. of a 2 per cent. solution of silver nitrate and set aside for ten minutes. If the precipitate darkens rapidly and becomes black, the urine is from a breast-fed baby. If it remains white or darkens but slightly, the child is being artificially nourished. While perhaps not of great practical importance, the test, which seems well established, is of so much interest that it warrants notice.

CORRESPONDENCE

PARIS LETTER.

CURATIVE VACCINATION FOR STAPHYLOCOCCIA.

By AUGUSTE A. HOUSQUAINS, M. D.

The successful undertakings of Sir Almroth Wright have been an incentive to the further study of vaccines. It was Wright who was the first to inoculate man, and for his therapy he employed an emulsion of heated sterilized staphylococci. Influenced by this fact, Mauté in France undertook a series of researches which has resulted in a method which, though not perfect, is without doubt of considerable excellence in the treatment of staphylococcia and furunculosis.

The active immunity conferred by the vaccines is, as one knows, of longer duration than that which follows the injection of serums. The action of the latter being transient, Mauté applied his researches to the study of antistaphylococcic vaccine, by which means he realized an efficacious and durable therapy for furunculosis. Mauté has published the technique and the therapeutic application of vaccine as well as the therapeutic results which he has achieved.

The antistaphylococcic vaccine consists of a sterilized microbial emulsion which is preserved in sealed tubes. Under the name of stock vaccines the English laboratories deliver to the doctors specialized vaccines, such as acne, furuncle, anthrax, or the bacteriological variety (staphylococcus albus and aureus). Mauté prefers the autogenous vaccine, that is to say, one prepared for each disease from that particular strain of the bacterium already producing the infection of the patient. It is only by employing the autogenous vaccine that one can obtain a perfect specialization and a remarkable constancy in the results. Even from a theoretic point of view, this manner of procedure is completely justifiable because, as one knows, the chromogenic power of the staphylococcus does not alone suffice to differentiate the different varieties of the disease. On the contrary, it is necessary to modify somewhat the biological qualities of a microbe so that it may live in an organism. We know that the staphylococci, though they produce similar lesions, are not identical from the point of view of their virulence; hence, what is most important to remember is the condition of the patient who is about to be subjected to treatment. Moreover, the criterion is furnished by observation and clinical results. The results furnished by the autogenous vaccines are, according to Mauté, incomparably the best. In certain chronic cases in which the same treatment should be prolonged if good results are desired, it is well at times to try a new vaccine, not because the first has not con-

served its primitive qualities, but because the pathogenic organism may change its type so as to adapt itself better to other immunizing products.

The two sorts of vaccines may be employed simultaneously. The strength of the vaccinal product is calculated by the number of bacilli contained in each cubic centimetre. The injection itself has no special indication. It must be made under the skin, by preference in the thigh, according to the usual methods of asepsis. When done in this way there are no local complications.

As regards the doses, Wright thinks that we ought to calculate them according to the modifications in the opsonins, that is to say, by ascertaining an opsonic index. Mauté is of the opinion that this is necessary. He employs a vaccine of 500,000,000 to the cubic centimetre. The first dose is one-fourth of a cubic centimetre, followed at an interval of five days, by a dose of one-half cubic centimetre. Six days later he employs a dose of one cubic centimetre. Intervals of seven, ten and fifteen days should occur, during which the doses are increased to two and sometimes to three cubic centimetres. One can easily understand that the determining of the frequency and quantity of the injections should be based on the local and general reactions presented by the patient. No harm is done by prolonging the treatment, and it is even advisable to make from four to five injections after the disappearance of the lesions.

The local reaction is almost *nil*. All that can be noticed in certain cases is a slight redness or a slight tumefaction which appears at the end of twelve or twenty-four hours. The pain is absent, or if present, very slight. It is well to make the injection deep under the skin. In furunculosis there appears at times, at a point of injection, a real reaction which results in furuncles that develop rapidly. A number of these, which seem quiescent, suppurate and the healing is rapid. The effect on the general condition is habitually *nil*; it is seldom that one notes in certain cases, fatigue with somnolence and heaviness of the head.

Although there is no therapy that is applicable to all forms of staphylococcic infection, the vaccine therapy, such as it is to-day, is most effective in the subacute or chronic forms as well as in the forms that have a tendency to recidivation. That is to say it is especially applicable to staphylococcia of the skin.

In inflammatory acne, be it phlegmonous and pustular, the suppurative tendencies are checked; the pustules being transformed into simple papules. In sycosis one often obtains good results by employing anti-staphylococcic vaccine; but here local treatment is necessary and all causes of direct irritation should be abated.

March 10th.

BOOK REVIEWS.

THERAPEUTIQUE CLINIQUE DE LA SYPHILIS. Par E. Emery, Médecin de Saint-Lazare, Ancien Chef de Clinique a l'Hopital Saint-Louis, et A. Chatin, Médecin des Eaux D'Uriage. Paris: Masson et Cie. 1909. Price, 10 fr.

This is an eminently practical and interesting book. There is yearly a great mass of literature published upon syphilis, but the profession is in need of practical, concise treatises upon the various phases of this protean disease. A work such as this one is timely and should have an English translation. It virtually exhausts the subject of the therapy of syphilis up to the time it was written, devoting a full discussion to all the methods of giving mercury and the various salts used, especially by injection. The book is composed of 600 pages, entirely devoted to the therapy of syphilis in all its phases, giving detailed and explicit directions for every possible indication. It is divided into two parts. The first is consecrated to the study of the remedies used as antisyphilitics, their mode of administration, and to the treatment of syphilis in general. In the second part the authors discuss the treatment of the local accidents of syphilis, those of the skin, the mucous membrane, and the principal visceral manifestations. The whole work is clearly written, precise and highly practical. It is a pity it was written before "Salvarsan" was discovered; for if this drug were discussed in the same spirit, as are the other subjects, the work would indeed be complete.

LES MALADIES DU CUIR CHEVELU.—III. Les maladies cryptogamiques: les teignes, par le Docteur R. Sabouraud. Paris: Masson et Cie. Price, 30 fr.

This is the third volume of an exhaustive work on the diseases of the hairy

skin, and is entirely devoted to the cryptogamic or fungous diseases of that region. The volume consists of 855 pages with 433 figures and 28 plates. Sabouraud here attempts to separate and identify all the parasites discovered and to establish their relationship and clinical types. It is a colossal and wonderful work and must remain a classic. Part I. is devoted to the history of the subject; Part II. to methods and technique of study; Part III. and IV. to ring worm; Part V. to favus; Part VI. to the study of the comparative mycology of these dermatophytes; Part VII. to the biology; Part VIII. to treatment. Sabouraud's contributions to the study of the bacteriology of skin diseases are widely known. His skill in technique and his knowledge of biology, together with his unlimited facilities for study and abundance of clinical material, has enabled him almost to exhaust the subject and stand as the world's leading authority in this branch of dermatology.

The work is highly technical and exhaustive, yet is practical enough to hold the interest of those who are not out and out technicians.

DISEASES OF THE ANUS, RECTUM AND SIGMOID.—For the use of Students and General Practitioners. By Samuel T. Earle, M. D., Professor Emeritus of Diseases of the Rectum in the Baltimore Medical College, Surgeon in Charge of Rectal Diseases at St. Joseph's Hospital, the Hebrew Hospital, and the Hospital for Women. With 152 Illustrations in the Text. Philadelphia and London: J. B. Lippincott Company.

The writer has given in a concise and clear manner the more important and recent knowledge of the diseases of the anus and rectum. The book serves not only as a text, but also as a reference work. The work of others has been quoted freely, and in methods of technique and treatment they have been

quoted verbatim from the recent literature. The chapter on constipation is very complete. Much of interest could have been added to the study of the sigmoid. Special chapters on Lesions of the Coccyx and Congenital Idiopathic Dilatation of the Colon make a new departure for such works. Some of the illustrations are original, but the majority have been taken from older texts and from the original articles from which the quotations are made.

A MANUAL OF PHYSIOLOGY WITH PRACTICAL EXERCISES. By G. N. Stewart, M. A., Professor of Experimental Medicine in Western Reserve University, Cleveland. Sixth Edition. New York: William Wood & Company. 1910.

This book has established for itself a too well-recognized place in the realm of medicine to need any introduction or even recommendation. The present edition is extensively revised with the addition of much that is new.

The description of the red blood-cells as biconcave discs is still retained. An interesting section is devoted to the description of the neurogenic and myogenic theories of the heart-beat, and while the author seems to favor the former, both sides of the question are freely stated.

A considerable amount has been added to the section on Internal Secretion. The latest advances in this subject of ever-widening importance are noted, and various conflicting views discussed. A short portion of the chapters on electrophysiology is devoted to the interesting subject of the human electro-cardiogram, and this entire chapter is worthy of careful study by those who wish to appreciate the recent work in the diagnosis of cardiac disease by this method.

A MANUAL OF CHEMISTRY, INORGANIC AND ORGANIC, ADAPTED TO THE REQUIREMENTS OF STUDENTS OF MEDICINE. By Arthur P. Luff, M. D., London, and Hugh G. H. Candy, B. A., London. Fourth Edition with 46 Illustrations. Chicago: Chicago Medical Book Company. 1910.

The work deals with those chapters in inorganic and organic chemistry, which most concern the student of medicine. The more important laws and theories underlying our system of chemistry are clearly and concisely explained. There are numerous instructions as to laboratory technique, accompanied by illustrations and diagrams. A more pretentious and practical exterior would enhance the value of the book.

SYPHILIS. By Sir Jonathan Hutchinson, F. R. S., L. L. D., F. R. C. S. New York: Funk & Wagnalls Co. 1910. Price, \$3.00.

This is a new and enlarged edition of Jonathan Hutchinson's well-known work. No practitioner of medicine or surgery should be without this classic. The cases cited from a long life of close investigation and critical observation are alone invaluable. No one observer has added more to medicine and surgery and in more varied fields than the author of this volume. We only wish it were larger, as every page of it is of inestimable value to the reader.

SYPHILIS: ITS DIAGNOSIS, PROGNOSIS, PREVENTION AND TREATMENT. By Thomas Pugh Beddoes, M. B. B. C. Camb., F. R. C. S., Eng. New York: Paul B. Hoeber. 1910. Price, \$2.00.

The volume consists of 224 pages, containing many statements rather loosely and carelessly made: as on p. 5, "in the skin accidental traumatism often causes ulceration," and on p. 9, "soft sores are due to infection by micro-organisms." What micro-organisms? Syphilis is also due to a micro-organism.

The book, as an exposition of advanced thought and work upon syphilis, falls short of the mark.

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- THE RELIGION OF BEAUTY AND THE IMPERSONAL ESTATE. By Ralcy Husted Bell. New York: Hinds, Noble & Eldredge. Price, \$1.25.
- TEXTBOOK OF MASSAGE. By L. L. Despard, Member and Examiner Incorporated Society of Trained Masseuses. New York: Oxford University Press. 1911.
- LA BASE DE TOUTE REFORME—La Régénération Physique et Mentale de l'Homme par la Réforme alimentaire. Par Otto Carque. Brussels: Paul Nyssens. 1911. Price, 2 fr.
- TWENTY YEARS AT HULL-HOUSE—WITH AUTOBIOLOGICAL NOTES. By Jane Addams. Author of "Democracy and Social Ethics," etc. With Illustrations by Norah Hamilton. New York: The Macmillan Company. 1910. Price, \$2.50.
- HANDBOOK OF THE SURGERY OF THE KIDNEYS. By W. Bruce Clarke, M. A., F. R. C. S., Senior Surgeon to St. Bartholomew's Hospital. With 5 Plates and 50 Illustrations in the Text. New York: Oxford University Press. 1911.
- INEBRIETY—A Clinical Treatise on the Etiology, Symptomology, Neurosis, Psychosis and Treatment and the Medico-Legal Relations. By T. D. Crothers, M. D., Supt. Walnut Lodge Hospital, Hartford, Conn. Cincinnati: Harvey Publishing Company. 1911.
- A CAREFUL STUDY AND PRESENTATION OF MALARIA AND ITS MANIFESTATIONS—With the Most Thorough and Exhaustive Methods of Treatment of Any Work of its Kind on the Subject. By J. H. McCurry, M. D. Memphis: S. C. Toof & Co. 1910. Price, \$1.00.
- LA DECOMPRESSION CERERTALE PAR L'OUVERTURE DU CRANE ET SES INDICATIONS. Par Le Dr. Just Lucas-Championnière, Chirurgien honoraire de l'Hotel-Dieu, Membre de l'Académie de Médecine, Président de la Société internationale de Chirurgie. Paris: 8, Rue de Nesles. 1910.
- DIE STOERUNGEN DER SPRACHE. VERSUCH EINER PATHOLOGIE DER SPRACHE. Von Dr. Adolf Kussmaul, Professor in Strassburg. Vierte Auflage herausgegeben von Professor Dr. Hermann Gutzmann, Leiter des Universitaetsambulatoriums fuer Sprachstoerungen in Berlin. Leipzig: F. C. W. Vogel. 1910. Price, 10 Mk.
- LANDMARKS AND SURFACE MARKINGS OF THE HUMAN BODY. By L. Bathe Rawling, M. B., B. C. (Cantab), F. R. C. S. (Eng.), Surgeon With Charge of Out-Patients, Demonstrator of Practical and Operative Surgery. With Thirty-One Illustrations. Fourth Edition. New York: Paul B. Hoeber. Price, \$2.00.
- MANUAL OF CYSTOSCOPY. By J. Bentley Squier, M. D., Professor of Genito-Urinary Surgery, New York Post-Graduate Medical School and Hospital, and Henry G. Bugbee, M. D., Instructor in Genito-Urinary Surgery, New York Post-Graduate Medical School and Hospital. New York: Paul B. Hoeber. 1911. Price, \$3.00.
- ACCIDENTAL INJURIES TO WORKMEN—With Reference to Workmen's Compensation Act, 1906. By H. Norman Barnett, F. R. C. S. Surgeon, Cripples' Home, Belfast, etc. With Article on Injuries to the Organs of Special Sense. By Cecil E. Shaw, M. A., M.Ch., M. D. and Legal Introduction. By Thomas J. Campbell, M. A., LL.B. New York: Rebman Company. Price, \$2.50.

DIE IMMUNITÄTSSWISSENSCHAFT. Eine kurz gefasste Uebersicht ueber die Immunotherapie und Diagnostik fuer praktische Aerzte und Studierende. Von Dr. Hans Much, Oberarzt am Eppendorfer Krankenhause. Mit 5 Tafeln und 6 Abbildungen. Wuerzburg: Curt Kabitzsch. 1911. Price, Mk. 7.20.

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COMPEND OF GYNECOLOGY. By Wm. Hughes Wells, M. D. Associate in Obstetrics in the Jefferson Medical College; Assistant Obstetrician in the Jefferson Medical College Hospital; Fellow of the College of Physicians of Philadelphia, etc. Fourth Edition, Revised and Enlarged with 153 Illustrations. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$1.00.

THREE CONTRIBUTIONS TO THE SEXUAL THEORY. By Prof. Sigmund Freud, LL.D., Vienna. Authorized Translation. By A. A. Brill, Ph.B., M. D., Clinical Assistant Department of Psychiatry and Neurology, Columbia University. With Introduction by James J. Putnam, M. D., New York: The Journal of Nervous and Mental Disease Publishing Company. 1910. Price, \$2.00.

A HANDBOOK OF PRACTICAL TREATMENT. By Many Writers. Edited by John H. Musser, M. D., LL.D. Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia; and A. O. J. Kelly, A. M., M. D. Assistant Professor of Medicine in the University of Pennsylvania. Volume I. Philadelphia and London: W. B. Saunders Company. 1911. Price, \$6.00.

ATLAS OF MICROSCOPIC DIAGNOSIS IN GYNECOLOGY—With Preface and Explanatory Text. By Dr. Rudolf Jolly, Priv. Doc. Chief Physician of the Gynecologic Clinic University of Berlin. Only authorized English Translation. By P. W. Shedd, M. D. New York. With 52 Lithographs in Color and 2 Textual Figures. London: Rebman, Limited. Price, \$5.50.

REMEDIAL GYMNASTICS FOR HEART AFFECTIONS—Used at Bad-Nauheim Being a Translation of "Die Gymnastik Der Herzleidenden" von Dr. Med. Julius Hofmann und Dr. Med. Ludwig Pohlman. By John George Carson, M. D., Edin., etc. Physician to the Sanatoria and Bad-Nauheim, Eversley, Hants. With Fifty-One Full-Page Illustrations and Diagrams. New York: Paul B. Hoeber. 1911. Price, \$2.00.

HANDBOOK OF TREATMENT FOR DISEASES OF THE EYE. By Curt Adam, Assistant-Surgeon in the I. University Clinic for Diseases of the Eye, Berlin. With a Preface by Prof. von Michel, Berlin. Translated from the Second German Edition (1910). By William George Sym, M. D., F. R. C. S. Ed. and E. M. Lithgow, M. B., F. R. C. S. Ed. With Thirty-Six Illustrations. New York: Rebman Company. Price, \$2.50.

DISEASES OF THE ANUS, RECTUM AND SIGMOID—For the Use of Students and General Practitioners. By Samuel T. Earle, M. D. Professor Emeritus of Diseases of the Rectum in the Baltimore Medical College, Surgeon in Charge of Rectal Diseases at St. Joseph's Hospital, the Hebrew Hospital, and the Hospital for Women. With 152 Illustrations in the Text. Philadelphia and London: J. B. Lippincott Company.

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INTERSTATE MEDICAL JOURNAL

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THE RELIGIO-MEDICAL MASQUERADE—A COMPLETE EXPOSURE OF CHRISTIAN SCIENCE. By Frederick W. Peabody, LL.B., of the Boston Bar. Boston: The Hancock Press. Price, \$1.00.

DEPARTMENT OF COMMERCE AND LABOR BUREAU OF THE CENSUS. E. Dana Durand, Director. Bulletin 108. Mortality Statistics: 1909. Deaths, Causes of Death, Comparisons with 1908, Deaths of Infants and Young Children, Occupational Mortality. Washington: Government Printing Office. 1910.

DR. JESSER'S DERMATOLOGISCHE VORTRAEGE FUER PRAKTIKER. Heft. 9. Die Hautleiden kleiner Kinder. Von Dr. S. Jessner, Koenigsberg i. Pr. Dritte Auflage. Wuerzburg: Curt Kabitzsch (A. Stubers Verlag). 1910. Price, 1 M.

THE SEXUAL DISABILITIES OF MAN AND THEIR TREATMENT. By Arthur Cooper, Consulting Surgeon to the Westminster General Dispensary; Formerly House Surgeon to the Male Lock Hospital, London. Second Edition Revised and Enlarged. New York: Paul B. Hoeber. 1910. Price, \$2.00.

OBSTETRICAL NURSING FOR NURSES AND STUDENTS. By Henry Enos Tuley, A. B., M. D., Professor of Obstetrics, Medical Department, University of Louisville; Visiting Obstetrician and Lecturer on Obstetrics to Training School for Nurses, John N. Norton Memorial Infirmary and the Louisville City Hospital. Second Edition, Revised and Rewritten. With 73 Illustrations. Louisville: John P. Morton & Co. 1910. Price, \$1.50.

THE ESSENTIALS OF MATERIA MEDICA AND THERAPEUTICS FOR NURSES. By John Foote, M. D., Assistant Professor of Therapeutics and Materia Medica, Georgetown University School of Medicine; Instructor in Materia Medica and Therapeutics, Providence Hospital Training School for Nurses. Philadelphia and London: J. B. Lippincott Co. 1910.

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EDITORIAL.

THE NEW NATIONAL HEALTH BILL.

The measure for a National Department of Health is thus far neither lost nor won. The failure of the bill to make its passage through the last Congress is an undoubted advantage to everybody concerned, for the new bill introduced by Senator Owen into the present Congress shows the profitable fruits resulting from the free discussions and equally frank criticisms of the former measure, both inside and outside the profession; and the outcome is a far more practicable and statesmanlike document, since the interests of all the pros and cons are well conserved.

As regards the motives which actuated the original bill, and the genuineness of its aims, no question need be raised, at least among medical men. Whatever shortcomings it may have exhibited were faults of judgment, not of intent. Like almost every newly-embodied reform, it was radical in its spirit, and vague in its letter. The present bill, matured by criticism and reflection, is more conservative in its scope, and its logical construction and practicality are factors which should not go unheeded.

The honest and disinterested objectors to the measure, fall readily into three classes. (The dishonest and interested objectors need not be reckoned with.) (1) Those who regard it as unnecessary, and who may be called reactionaries. (2) Those who view it with alarm as subversive of state rights and individual liberty, and who may be termed radicals. (3) Those who, while admitting the advantages and the legitimacy of the measure, nevertheless fear that its administration will give rise to abuses which will more than offset its benefits.

To the first of these classes, of course, no new legislation that may show the inherent weakness and worthlessness of an old system is justifiable. One cannot argue with a reactionary, albeit, as will appear, the present

bill has in it an element of rejoinder even to these nugatory objections.

To the second class of objectors the construction and language of the revised bill ought to furnish ample evidence of the good faith of its proponents and security of the rights guaranteed under the Constitution. The most rabid stickler for personal liberty can find nothing in this measure which, by the furthest stretch of imagination, could be suspected of conflicting with the bill of rights. It ought, indeed, to be broadly apparent that no such subversive powers could, in the nature of things, be conferred by such a statute, since all such usurpations are exercises of police power, and Congress has no police function either to exercise or to delegate. And it should be equally apparent that in whatsoever the statute creating the Department might transcend the provisions of the Constitution, it would be to that extent untenable, and a remedy is readily at hand. But the fact is that neither of these broad elements of assurance needs to be invoked, since the specific stipulations of the province and duty of the proposed Department carefully draw the prohibitive circle around these touchy points, and expressly exclude the recognition by the Department of any school or system of medicine. Not only do its province and duties include nothing of a mandatory or prohibitive nature, being limited to the "fostering and promotion of the public health, and to the collection and dissemination of information relating thereto," (and the detailed specification of Bureaus in Section 5 dispels any lurking suspicion of dangerous indefiniteness about these definitions), but the concern of the Department is altogether with matters in which no shade of opinion or personal belief is involved, and in which, therefore, no question of individual liberty is at stake—matters of fact and observation in which all are equally represented.

The third conservative class of objectors is perhaps the most plausible in its attitude, and under the original form of the bill—radical in its departures and loose in its specifications—might have had a good show of reason for its opposition. But the conservative censorship displayed in the construction of the present bill would seem completely to disarm this kind of objection. The fact is—and here is to be found the rejoinder to the reactionary objectors—the bill now before the Senate is, in effect, little more than a sensible centralization and orientation of the health functions of the Federal Government which already exist in scattered and disjointed, and hence in proportionately ineffective, form. To organize and dovetail them will not only vastly increase their efficiency, but by just so much will lessen their opportunity for leaks and graft and other sorts of abuse; and if abuses do occur, it will be a much simpler matter to place responsibility and apply a corrective.

In short, a careful and intelligent scrutiny of the new bill shows it in the light of a conservative and statesmanlike step in the right direction, and drawn up with the view of effecting a legislative advance with the least possible disturbance of existing conditions. The criterion of good and wise legislation is caution which has been so well-weighed that snares and pitfalls may be avoided, yet broad and potential enough to afford ample range for judicial expansion and development as time and experience may suggest. Whatever may have been true of the former bill, the present one is worthy the intelligent, active support of the entire profession. No man need be ashamed to sponsor it, or afraid to defend it against all antagonists.

THE BOY SCOUTS.

No subject in medicine in recent years has received closer attention, on the part of thinking medical men, than that of athleticism. Just what this rather awkward word means, no one has yet decided; for if we are to believe the opponents of the education of the body, it is a Juggernaut that mows down all our vital forces, though the development of the muscle may deceive us for a time; and, if we rally with the enthusiasts, a diametrically opposite view is taken that is turgid with promises of a bodily health that must be an ungracious host to the many diseases which are continually battling for entrance into our organism. The philosopher, whose mood is gentle and whose voice has not the resounding qualities of a protagonist, must needs view the situation with a considerable degree of humor,—that is if his readings have been among the various medical journals which publish articles on athleticism with rare indiscrimination,—for directly one or another physician sees a “case,” be it that of an adolescent, whose judgment has been askew, or a corpulent subject who, at the age of fifty, is desirous of developing his muscles at the expense of his overweight, the disastrous results are chronicled in the medical press, and another “case” is on record to swell the statistics showing the untoward consequences from subjecting the body to violent exercise. The articles in question are not as worthless as they would seem at first sight, but where their error lies is in this, that the foolhardiness, on the part of the embryo athletes, is completely overlooked and the inroads on their health greatly exaggerated. But if the real cause of ill-health in after-years is not made as attributable to lack of common sense as it should be in these articles, we should not wax indignant, for the rank and file of our medical writers—and for that matter even some of the elect—are rarely philosophers: as may be wit-

nessed upon reading the multifarious articles on ventilation and draughts, or the recent utterance of Sir Almroth Wright before the National Health Society of London, as to the devilish inherent qualities of soap and water!

What ought to interest medical men in the matter of athletics—and now we are not disparaging any one article that may open our eyes to its abuses—is the subject of physical training and boyhood. By the advocacy of what should constitute the physical life of the growing youth, ideas are instilled which must bear fruit; for a sanity might be learned in connection with athletics that will remain with the subject even during those troublous years, when his girth proclaims that the laxity he has been indulging in must cease. To harden the muscles in youth cannot be aught but an excellent foundation for the superstructure which the coming years erect: the superstructure that is necessarily continually at war with the exigencies of our superior civilization.

To combat the physical detriments which accompany the mature days of a normal man's life, a movement has been started in this country that should have the full support of all medical men. We are now referring to the Boy Scouts, an organization that is the counterpart of a similar organization in England, the incentive for which sprang from the fertile brain of Sir General Robert Baden-Powell, the defender of Mafeking. And if one tears oneself away from all ideas of militarism—the movement, though started by a military man, has none of those objectionable features which at once convert our anti-militarists into bulls in china shops—one can see that here we have what is about the sanest chapter in the stupendous and wellnigh unintelligible series of books on the physical training of the young. For, be it said at once, those exact and precise Teutonic ideas, which have obsessed us for years in the matter of gymnastic performances, have been abolished, and in their stead a number of physical exercises of the mildest sort have been introduced. What these are can be well summed up by the statement that they are all practised out-of-doors, and have the great advantage of being superior to the turning-pole and dumb-bells in so far as stuffy rooms are no longer a necessary concomitant. Cross-country walks, target practice, musketry drills, the deep inspiration of fresh air, the free play of the muscles, the mental equipoise which only contact with Nature can teach, are surely assets in this new physical training that should give us pause. The very simplicity of all the ideas, which the English organizer formulated, and which Mr. Ernest Thompson Seton is advocating so successfully in this country, is illustrative of the fact that in simplicity lies the hope of a betterment of our physical structures, and that the sooner we restore

Nature to her former position of unrivalled instructress, just so soon will our manhood be a text for stirring sermons. So, perhaps after all, Rousseau was right.

A "FREUDIAN" NOVEL.

A student of modern medicine, who is interested in the interplay of medical theories and the trend of literature, cannot but be struck with the truism that certain forms of literature—plays and novels, especially—derive their inspirations and impulses, in quite a goodly number of cases, from the theories which are uppermost in the medical mind. The literary brain, it would seem, ever on the look-out for new ideas, takes kindly to the appropriation of current medical thought, and while in some instances the appropriation is attended by a sensationalism that spells distortion of the real facts, in others the resultant performance is far from being mean. Illustrations of this assertion are to be found in Zola's "L'Assommoir" and Ibsen's "Ghosts," to cite two works of unusual merit, though these by no means exhaust the list of the literary photographs which contain, in a striking manner, medical verisimilitudes that might with profit engage the earnest thought even of the closest students of medical textbooks. We say "with profit," for can it be asserted, with any show of reason, that when the picture is limned by a master there are no advantages in a presentation that is no longer the dry-as-dust syndrome, unassociated with temperament, idiosyncrasies, and environment?

If, therefore, it is right and proper, from our point of view, to transfer medical facts to plays and novels, provided the crucible through which such facts pass is a dependable instrument, our attitude is nevertheless stubbornly non-acceptant, if the unproved theories of a medical author are set forth in such manner that the art of the novelist gloses over their inherent weaknesses so that the uninitiated are led to believe the principal character depicted one of a type. A case in point is the novel "Das Gefährliche Alter" (The Dangerous Age), as it is called in German, by the Danish writer, Madame Karin Michaëlis, and which, on account of the Freudian sexual theory of hysteria that it embodies in its heroine, Elsie Lindtner, and a number of her intimate friends, has been seized upon by the critics and thousands of readers in Germany as a type of womanhood that is prevalent enough to arrest attention.

We would not pause over this literary expression, for any length of time, were it not that here is no tried medical fact brought to light in

fiction, but a theory that has been disputed by such men as Alt, Aschaffenburg, Foerster, Moll, Friedlaender, Kraepelin, Heilbronner and others. As a theory it might stand for much in medical literature, but outside its appointed province, especially when it is garnished with considerable literary grace, it can be productive of nothing else but great harm; a statement which is not an exaggeration, since already the majority of the recognized critics in Germany are loud in their praise of a writer who has the courage to tell the truth about women. And here it would be well to draw the attention of the reader to the vast difference between medical facts and theories, when these are exploited in the literature of the day. A fact is applicable only to a limited number of persons, no matter how desirous the critic or intelligent reader may be to make its applicability universal; whereas a theory, on account of its elasticity, is so adaptable to all, that at once it is made to fit every case that shows the slightest deviation from what the superficiality and narrowmindedness of both critic and reader considers normal. This was well shown when Lombroso gave his ideas on degeneration to the world, and if we mistake not the same farce is about to be repeated in connection with the Freudian sexual theory of hysteria.

OPINION AND CRITICISM.

BACTERIOLOGY IN 1720.

Those of us, who are inclined to think that systematic bacteriology began in the latter part of the nineteenth century, would be surprised to know that among the earlier and sometimes vague gropings for the truth of the early eighteenth century, there resulted at least one book with a clear and definite purpose. According to a recent number of the *Lancet*, the year 1720 produced a book by Benjamin Martin, entitled "A New Theory of Consumptions, more especially of a Phthisis, or consumption of the lungs wherein enquiry is made concerning the prime essential and hitherto accounted inexplicable cause of that disease so very endemic to this nation." The abstracts of this book as given in the *Lancet* are really remarkably clear, and leave no doubt that the author considered tuberculosis, and other infectious diseases like leprosy and syphilis to be due to specific micro-organisms whose character must vary with the disease. Furthermore, definite ideas are expressed regarding the mode of infection, of secondary infections, and of the metastatic processes seen in some infectious diseases. It is especially interesting to notice that Martin explains in the same way as is explained to-day, why not all people who are associated with tuberculosis become infected, by his suggestion that possibly the number of *animalcula* is not sufficient to produce trouble, or that the patient in whom they lodge does not furnish good soil for their growth. This is not much further than we have got in the study of infectious diseases to-day.

It would, indeed, be unusually interesting and instructive to make a comparison between the original book of Martin and Pasteur's work, or the latest textbooks on bacteriology and infections. The pendulum of medical thought, constantly swinging from one point to another, almost invariably hits a point which has been previously reached; consequently discoveries of old facts are much commoner than the finding of something perfectly new. Possibly this explains to a certain extent the tendency of many continental writers to re-discover anything in scientific medicine that has been previously discovered and discussed by an American writer.

* * * * *

This brings up forcibly the state of affairs in the medical literature of to-day and the inconveniences to a reader bent on acquiring further knowledge in his specialty. Anyone doing scientific medicine either in the laboratory or in practice is confronted with a problem of grave

import—how to do his reading. He must read to keep up with the times, and yet the material he needs is often so scattered as to make it impossible for him to gather it together. No matter how ambitious or how zealous a man may be, no matter if he has learned "How to Live on 24 Hours a Day," he must neglect something. How to give the reader the best opportunity to do his reading is not an easy problem to solve. To-day the profession must carry the burden of new and revised editions, of systems in duplicate, of several books filling the same purpose, and, in general, of an over-abundant production of medical literature. Many so-called revised editions—new editions—are simply financial enterprises in which an addition of a few plates, or revision of one chapter makes an excuse for publication.

Should there not be a national or international clearing house of medical literature? Ought not a man who is interested, for instance, in the study of diabetes, be able to find grouped together, practically in one binding, all the work on diabetes? It surely would be better, not only for the convenience of the reader, but for the historical recording of medicine, if some such scheme were practical. A worker in one subject would be enabled very easily to find out exactly what has been done in that subject, and a repetition of work already done would be prevented to a great extent. The economy to all concerned is too manifest to be further emphasized.

Perhaps the monographs, or the collection of articles by specialists on one subject, will offer at least a partial solution to this question. The standard textbooks, or one good system as a working basis, in addition to these monographs, would give a specialist practically all he needs, and would offer a constant supply of literature on the latest phases of the subject in which he is interested.

ANOTHER MOVE IN MEDICAL EDUCATION.

If the announcement regarding the changes in the staff of the Johns Hopkins Hospital, requiring all members to give up private practice and devote their time completely to hospital and teaching work will stand, certainly a new era is in store for American medicine. Just as Johns Hopkins was the first institution in this country to demand a high standard of preliminary medical education in students, so it seems it would be the first to demand corresponding qualifications in its professors in the clinical branches.

The idea that medicine, surgery, gynecology and obstetrics should be as much a part of a university curriculum as are the so-called pre-medical sciences, has been gaining ground very rapidly in this country, and has already taken firm root abroad. In these columns we have often referred to the necessity of basing the practice of medicine on scientific grounds,

and we have often urged that one solution was the inauguration into the professorships of the clinical branches, of men highly trained for that position, who shall devote certainly the major part of their time to teaching, and to carrying on that amount of investigation which the progress of to-day demands. Such positions cannot be filled by the men who devote an occasional part of their time to teaching. Whether at the present day, it is wise to require a complete requirement from private work, we think might be questioned. From the standpoint of the public, it might be said that the best men should be at their call; but this can be answered logically by permitting the "leader" to do private work in the hospital only. It should also be urged that in an idealized university course the position of head of the department must be supported by numerous men of a more purely clinical type; men who are as necessary for the successful performance of the duties of such department as is the head. These men, of course, need not give up their entire time to teaching, or hospital work, and they can well attend in just as good a manner to the demands of the public for consultation of the first order.

LITERARY NOTE.

Dr. Limon, according to the *Revue médicale de la Franche-Comté* for January, has recently discovered, in the library of his native town, Besançon, an interesting manuscript by a Milanese physician of the fifteenth century, one Guy Paré. The title of this valuable manuscript is "The Regimen of Health," and it shows most indubitably that the physicians of those far-away times understood the importance of hygiene even better than medicine, which we must admit was not quite the science it is to-day. The special branch of hygiene that should interest us in this manuscript pertains to the mouth, and considering the paucity of articles on this important subject in the medical journals, a reproduction of the author's wise instructions cannot be without point. Paré writes: "To maintain the mouth in a state of health, it is advisable to wash it with warm water before and after eating, because this cleanses the mouth and removes the humors from the gums. These humors arise from the food taken, and when not removed are conducive to a bad breath. It is necessary to clean the teeth daily by rubbing them each morning before breakfast with a powder prepared from cloves, nutmeg and a spice called spikenard, which is an ingredient of hippocras. The following will render the breath pure and sweet: lemon, galangal, aloes, a spice called 'mastic cinnamon myrabolan,' preserved Tribuli, and nutmeg. Item, the electuary made of quince; the electuary made of cloves; the electuary made of musk. The following render the mouth foul and from this one should guard oneself: Quicksilver corrupts the mouth and the saliva. Item,

the particles of food which remain between the teeth after eating, even when only milk is taken, and which decompose slowly, befoul the breath. Item, the mouth should be carefully washed and the gums rubbed with a powdered bark or peel that is bitter and styptic. Also a layer of this should be placed on the tongue. One should be careful about biting into things that are hard, lest the teeth break off, or eating dates, honey, and other sticky sweets. Vomiting should be stopped as soon as possible, since the teeth are affected in this way. Item, one should abstain from eating cold food because cold is harmful to the teeth. The following are also bad for the teeth: milk, pomegranate, leek and radishes. Lemon peel and sage leaves should be rubbed on the teeth. Also this powder: one drachm of hartshorn, one drachm of the seeds of a tree called thamaris, one drachm of a root called cyperi, one drachm of roses, one drachm of a spice called spica, and one-fourth of a drachm of rock salt. These ingredients should be well mixed and then passed through cloth. Before using this powder the teeth should be washed and all remains of food, that might be clinging to the gums, removed. Item, those princes and grand seigneurs, who wish to be careful as to the cleanliness of their teeth, should use a powder made of pearls and sugar. This is highly beneficial, but very expensive."

The advice given by this fifteenth-century physician might be studied to-day with profit, for it contains that insistence on mouth cleanliness which our advanced civilization is just beginning to consider as of moment. The preparations which were used may meet with criticism, especially the powder composed of pearls and sugar, but this is of minor importance compared with the knowledge, which was Paré's, in regard to what really constitutes prophylaxis in the matter of mouth hygiene.

ORIGINAL ARTICLES.

THE TREATMENT OF CLUB-FOOT IN INFANCY.

By DAVID SILVER, M. D., of Pittsburgh,
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That club-foot is practically curable, both as to form and function, in nearly all cases during infancy, and that, too, by relatively simple measures, has been sufficiently demonstrated. Yet that this happy result is by no means the rule and that, even when attained, the required treatment is often unduly prolonged or severe is well known. Moreover, despite the proven efficacy of proper treatment, it is unfortunately not uncommon to see cases that have been allowed to drag on into late childhood with deformity still uncorrected or those in which the use of inefficient apparatus has been persisted in until irremedial atrophy has taken place.

It may, therefore, not be out of place to again review the advantages of the treatment of club-foot during infancy and to discuss the principles and methods involved; the former especially, since some writers of excellent experience have lately advocated the delay of active treatment until the walking period has begun.

Advantages of Treatment in Earliest Childhood.—The advantages of beginning treatment at the earliest possible moment would seem sufficiently obvious. (1) Correction is facilitated in the first months of life by the cartilaginous nature of the bones and the more delicate condition of the soft parts; at birth deformity may often be readily corrected or even over-corrected. (2) The rapid increase in size during the early months of life is thus made to act as an aid in correction rather than allowed to favor adaptation to the deformed position. During the first three months the increase in size of the average child is about equal to that of the succeeding nine months, while the increase of the first year compared to that of the second is in the proportion of 16 to 5. (3) The earlier the foot is maintained in the over-corrected position the greater the chances of the bones acquiring their proper shape and so the more likelihood of securing perfect function.

The objections raised to treatment during the first months are chiefly the following: (a) The possibility of injuring the delicate tissues of the

foot or of impairing the general health of the young baby. Against this may be urged that the measures used may, and should, be adapted to the age and the condition of the infant, it being possible to gradually correct deformity without the use of measures which will irritate the normal infant. (b) The small size of the foot, and so the difficulty of keeping plaster-of-Paris and other dressings in place. This may be overcome early in treatment by the use of simple splints, maintained in position by adhesive plaster, or in some cases by the use of adhesive strapping alone. After a sufficient degree of correction has been secured to permit of the foot being placed in dorsal flexion, this difficulty is not so great; moreover, by carrying the plaster-of-Paris cast up over the flexed knee slipping is rendered less likely. (c) The fact that partial relapse may occur after walking has been begun, necessitating a second period of treatment or a second operative manipulation. It will hardly be claimed that relapse will be of frequent occurrence under careful treatment or, where it is allowed to occur, that it will be complete in more than occasional instances. The successful cases are far too numerous and the advantages of early treatment too great for one to be deterred by the disappointment of an occasional relapse. (d) That walking is necessary for a cure. It must be granted that a cure cannot rightly be claimed until the use of the foot in walking has demonstrated its normal condition. Yet while admitting this and also fully recognizing the value of walking in reshaping the bones of patients after the first year, I do not regard it as a necessity in cases in which treatment is begun soon after birth; and not only this but it even seems to me that *the fact that the little patient cannot walk has a distinct advantage in that it permits of the maintenance of a degree of over-correction which would be impossible for the walking child.*

Working Analysis of the Deformity.—In a discussion limited to the treatment of congenital talipes equinovarus the more minute pathology may properly be disregarded and attention directed only to the various factors which influence treatment. The two chief elements, the equinus (deformity of plantar flexion) and the varus (deformity of adduction and inversion), are present in such varying degrees that cases differ markedly and it is only by a proper estimation of the various factors present in the individual case that a good result can be easily and quickly secured. In attempting a working analysis of the deformity, these factors may be conveniently divided into three groups:—

I. Deformity in the foot.

1. Inward bending of the foot upon itself in the horizontal plane, —adduction.
2. Downward bending of the foot upon itself in the vertical plane, —cavus.
3. Inward bending of the foot upon itself in the sagittal plane, —inversion.

II. Deformity in the relation of the foot to the leg.

4. Extension (plantar flexion) of the foot upon the leg,—equinus.
5. Inward rotation of the foot upon the leg.

III. Deformity in the leg.

6. Inward rotation of the tibia upon the femur.
7. Inward rotation of the tibia and the fibula upon their own axes.

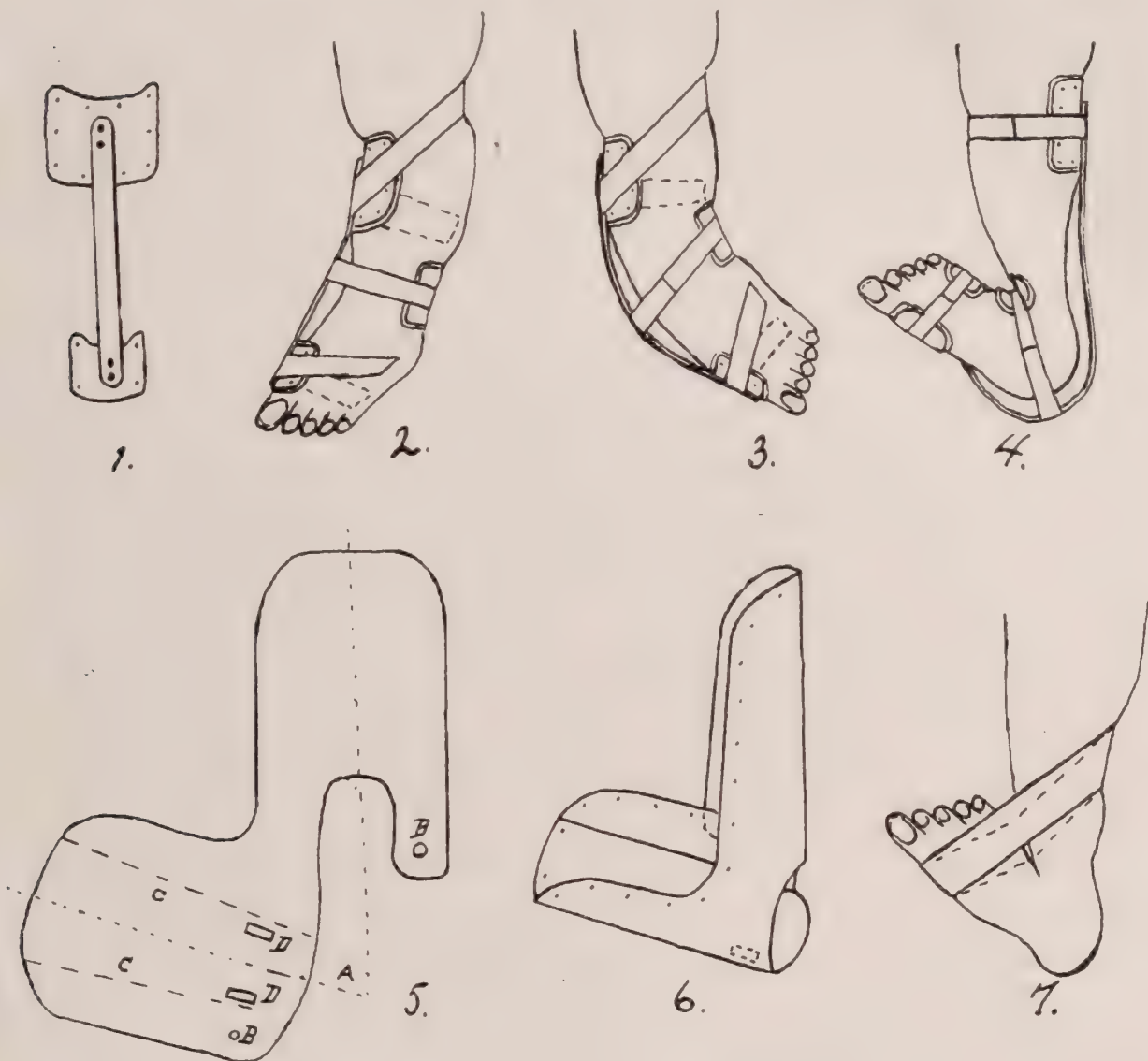


Fig. 1. Judson club-foot splint, unpadded.

Fig. 2. Judson splint, padded and applied; first position.

Fig. 3. Judson splint; varus corrected.

Fig. 4. Modified Judson splint for correcting the equinus while maintaining the correction of the varus.

Fig. 5. Pattern for Schapp's retention shoe. A—angle of dorsal flexion. B—rivet holes, one rivet only required. C—broken lines mark limits of sole. D—slots for padded strap over dorsum of foot.

Fig. 6. Schapp's retention shoe; dots mark perforations for attachment of padding.

Fig. 7. Jones' method of strapping to maintain extreme over-correction.

Requirements of Treatment.—The important requirements of treatment during infancy, may, in my opinion, be stated as follows:—

- (1) Over-correction should be secured *gradually by non-operative*

methods, yet as *rapidly* as is consistent with the health and comfort of the infant. Gradual over-correction is preferable, because it can be secured without risk or special discomfort to the little patient. As regards non-operative measures, it will hardly be denied that, with the same degree of correction, the functional results thus obtained will usually be better than those following other than the most simple operative procedures. Incidentally also, gradual, non-operative methods are much preferred by parents. "Gradual," however, does not mean slow, and no good reason can be adduced for dallying with treatment and stretching out the corrective stage over many months when two or three should suffice. Having analyzed the deformity and determined upon the methods indicated, the surgeon should bring the foot into the over-corrected position as early as possible in order that advantage may be taken of the rapid growth of the first months.

(2) Patients must be treated individually, according to the character of the deformity present. Cases differ markedly, since the various elements of the deformity (mentioned in the working analysis) are present in varying degrees; pronounced varus may exist with but slight equinus, or, on the other hand, the contracted tendo Achilles may offer almost the only resistance to immediate correction; the bending at the medio-tarsal joint may be so extreme in one case as to present a deep furrow, while in another the foot itself, although inverted, may be of almost normal contour. In some cases the inversion of a small, poorly developed heel may offer considerable difficulty, while in others a marked twist in the tibia and fibula, possibly unrecognized at first, may finally be found to explain a persistent in-toe; and so on.

(3) Extreme over-correction must be the rule. It is surprising to occasionally still read in current literature statements to the effect that the foot should be put up in "a slightly over-corrected position." The failure to secure sufficient over-correction is certainly the cause of very many of the partially cured cases that one meets. To be *cured*, a club-foot must have the same range of motion as the normal foot, and since it is necessary to allow a margin of relapse, it follows that only by securing extreme over-correction can we hope to obtain a cure. "If perfect correction it attained, relapse is exceptional."* The danger of producing a flat-foot by too energetic treatment is not great and is certainly unlikely to occur when cases are treated individually.

(4) Persistence in after-treatment is a necessity. Too often the physician evidently believes that he has discharged his duty when he has corrected the deformity and applied a walking brace, the fitting of which is unfortunately often left to the instrument maker. *After correction comes restoration of muscle balance*, and the latter requires as skillful attention as the former. Not until the patient can actively over-correct the foot is the object of treatment attained, and even then parents must

*Bradford and Lovett (*Orthopedic Surgery*, 1905, p. 525).

be warned of the possibility of late relapse and taught to watch for slight degrees of limitation of motion,—the first sign of beginning relapse.

Requirements of Methods and Appliances.—The variety of methods and appliances used in the treatment of club-foot is usually most confusing to the layman. He consults one surgeon who always uses plaster-of-Paris, a second who advocates a certain brace, a third who employs some other form of apparatus, and so on. It is hard for the layman, and also apparently for many physicians, to understand that the principles underlying the various methods and appliances are the same and that any dressing or apparatus which acts in accord with these principles, if properly used, will give the desired result, while an equally good result may be obtained in several ways. In judging the value of any special dressing or appliance, it should be considered from three standpoints. (1) Efficiency. It must fully meet the requirements of the case at that particular stage. (2) Simplicity. The simpler the appliance, other things being equal, the better, since simplicity makes for procurability, cheapness and ease of application. (3) Adaptability (a) to the patient and (b) to the surgeon. It must be suited to the age of the patient and the local condition of the parts, and should not demand unusual mechanical skill of the surgeon.

Methods of Treatment: Stage of Correction.—With few exceptions orthopedic surgeons agree that the varus element of the deformity should be corrected before anything is done with the equinus. The chief reason for this is the simple mechanical one of better leverage, since as long as the contracted heel cord persists we have its resistance to work against in abducting the fore part of the foot; a lesser reason is that correction of the equinus is as a rule easy, while the varus presents the chief difficulty. Occasionally, the equinus is the chief factor in producing the varus, in which event it naturally becomes the primary object of attack. Taking up then the actual course of procedure for the average case, I shall describe that which at present seems to me the simplest and the most satisfactory.

Correction of the varus, the first step, is accomplished by manipulations without anesthesia, repeated at short intervals, and by retention with the Judson splint.

In carrying out the manipulation it is *important that the different elements of the deformity be treated separately*. All manipulative measures must necessarily be carefully graduated to the size of the parts and the sensibility of the patient, with few exceptions partial correction only being attempted at one sitting and only so much being secured as is possible without traumatism or undue pain. In my opinion, however, *sittings should be at much shorter intervals than is generally the case*, every two to five days if possible, in order that complete correction may be very early attained.

Attention is first directed to the deformity in the foot itself and especially to that located in the medio-tarsal joint. The surgeon, sitting facing the child, grasps the heel and ankle with the left hand and the fore part of the foot with the right, these parts in the infant being easily held between the thumb and fingers; the fore part of the foot is then bent forcibly outward (horizontal plane) to correct the adduction, next pushed upward to flatten the sole and so overcome the cavus, and finally twisted outward to correct that part of the inversion located at the mid-tarsus. Turning next to the deformity in the posterior part of the foot and at the ankle, the grasp of the left hand is shifted upward so as to better protect the epiphysis from injury, while that of the right moves backward to include the heel, which is held between the thumb and fingers; the heel is now forcibly everted, and next the whole foot is rotated outward at the ankle. If any one element is present to an unusual degree, it is better to treat it alone for a few sittings, as for example, in case of a marked angular bend at the mid-tarsus the deformity in the posterior part of the foot and at the ankle should be disregarded for a time in order that its resistance may be made use of in abducting the front of the foot and also to avoid the danger of too great over-correction of the lesser elements. Twisting of the bones of the leg, if present, may be treated by grasping the bones firmly at the epiphyses, so as to protect them from injury, and forcibly rotating the lower portion on the upper. Manipulation of the equinus is at first disregarded, as has already been stated. When all the correction advisable at a given sitting has been secured, the splint is applied, or if this is not at once available, the amount gained may be retained by adhesive strapping after the method described later.

Judson's club-foot splint* (Figs. 1-3) consists of a narrow metal upright (of soft iron or brass), to each end of which is riveted a thin metal plate (of tin, aluminum or brass); in young infants the upright will usually be about four or five inches long, the upper plate one and a quarter to one and a half inches square, and the lower three-quarters to an inch square; the plates are perforated for the attachment of padding (a half thickness of sadler's felt is very satisfactory); a third unattached padded plate is used by Judson over the outside of the ankle but the felt alone is quite sufficient. This most excellent and useful appliance is simply a lever of the third class. It has the same mechanical action in this stage of the deformity as the plaster cast, but is lighter, is more easily applied to the small foot of the infant, retains its position better, is less likely to produce pressure sores, and can be readily removed by anyone should necessity arise.

The splint may be readily bent with a pair of pliers. In the different stages of the correction of the varus the inside of the leg and foot is first concave, then straight, then convex; the upright is always given

*Judson, A.: Growth and Deformity, 1905, p. 6.

a little less curve than that of the leg and foot, so that there will be a free interval between the two; as the curve changes from concave to convex, a longer upright becomes necessary. The upper plate is shaped to fit the inside of the leg near the head of the tibia, and the lower to fit the inside of the foot at the great toe joint. The splint may be applied with three circular strips of adhesive plaster, but a diagonal application of the upper and lower strips seems to me preferable, since when thus applied the brace is prevented from slipping down off the foot and there is no danger of constriction; in this method the upper strip, about an inch and a quarter wide and five or six inches long, starts on the outside of the knee, passes diagonally downward and inward across the upper plate, and then outward to end on the outside of the calf; the lower, about an inch wide and two or three inches long, starts just below the outer malleolus and runs in a similar manner across the lower plate to end on the outer edge of the sole. The middle circular strip is first given a turn around the upright and then carried several times around the ankle, which is protected by the felt pad, and the upright; when applied, it should still be possible to bring the leg closer to the upright by moderate pressure on the two between the thumb and fingers, else the pressure may be sufficient to irritate the child or even to cause a pressure sore over the great toe joint; if the upright stands off sufficiently from the leg, moreover, the attendant may be allowed to take up the slack each day by applying an additional circular turn over the preceding one, thus securing more rapid correction. A gauze bandage completes the dressing. When dressings are changed, both during the correction of the varus and subsequently during the early course of treatment, it is advisable not to allow the foot to draw back into the old position, since if this is permitted at each sitting, retraction of the lengthened tissues, which is as important in the establishment of a cure as is stretching of the contracted tissues, is delayed.

Manipulation and retention should be continued in this manner until a position of extreme valgus has been reached; this step in treatment should be accomplished in from two to six weeks in practically all cases seen soon after birth. The position of extreme valgus is then to be maintained, while the correction of the equinus, the next step in treatment, is begun.

Correction of the equinus may be secured by means of a slight modification of the splint just described, by plaster-of-Paris casts, by adhesive strapping in the milder cases, or by *ténotomy*.

In using the splint for this purpose (Fig. 4), its position is changed to the back of the leg; the upright, which must now be considerably longer, is bent to conform to the contour of the back of the leg and the sole when the foot is in the position of greatest possible dorsal flexion, a free interval between the two being necessary here also, especially at the heel; the upper plate presses against the calf, while the lower, which

must also be larger, grips the anterior half of the sole, this being given any desired degree of eversion by simply twisting the upright; the splint is secured with adhesive plaster in a similar manner to that already described, the middle strip passing over a pad placed in the fold at the ankle. Correction of the equinus is thus carried out by manipulation and retention with the splint in an exactly similar manner to that described for the varus. Plaster-of-Paris casts, or in mild cases adhesive strapping, may also be used after the methods to be described later. When the varus is fully over-corrected, tenotomy may be employed after about the third month in extreme degrees of equinus, in resistant cases, in cases in which the force necessary to correct the equinus would produce an undue flattening of the arch, or in those in the later months of first year where it seems advisable to hasten correction. The operation is such a simple one, no anesthetic being required in the earlier months; and results, under proper precautions, are so uniformly good that one should not hesitate to employ it in cases which do not yield readily to non-operative methods.

Stage of Retention.—When full over-correction has been attained, the second stage of treatment, the stage of retention, begins. For this there is nothing superior in the average case to a plaster-of-Paris cast. The question of how high the cast is to be applied is, in my opinion, the important one. If it be carried only to the knee and if any tendency for the foot to rotate inward be still present, a certain amount of such rotation will inevitably occur, for there is nothing to prevent the straight cylinder-shaped leg portion from turning. If, however, the cast be carried above the knee with the joint slightly ($15-20^{\circ}$) flexed, rotation cannot occur, for, as soon as it begins, the inner thigh portion of the cast is forced against the thigh. The early casts at least, therefore, should always be carried above the knee. It is desirable that the knee be flexed only enough to prevent rotation, for if flexed acutely, the gastrocnemius portion of the calf muscle will not be sufficiently stretched.

In applying the cast, the following technique will be found serviceable. For padding, ordinary sheet wadding, cut into strips of two or two and a half inches in width and rolled in bandage form, is excellent; the plaster bandages should be of the same width and are most convenient if made only three yards long instead of the usual six. After powdering the parts and applying pledgets of cotton between the toes, the foot and leg are bandaged firmly with several layers of the sheet wadding, moderate correction being meanwhile maintained. In applying the plaster bandages, the most satisfactory method that I have yet tried is to first apply a collar around the fore part of the foot*; as this sets, it is flattened out by being grasped between the thumb and fingers, and the fore part of the foot is thus given a proper shape, and constriction and distortion of the toes prevented, further freedom being also secured later

*Ehrenfried (*Boston Med. and Surg. Journ.*, Vol. 161, p. 741, 1909).

when the pledgets of cotton are removed. In applying this collar it is well not to carry it too far up on the dorsum of the foot, else later when the foot is dorsal flexed during correction the hardened upper edge of the collar may be forced into the fold at the ankle and sufficient pressure be produced to cause a slough; it is also well to carry one turn around the heel so as to prevent the collar from slipping forward. After the collar is finished, that part of the cast above the ankle is put on, the bandage being started just above the malleoli; just before finishing the thigh portion of the cast, the sheet wadding is turned down over the upper edge and caught in place with a few turns, thus protecting the skin from the rough edge of the plaster; the same procedure should be carried out at the distal end of the collar. When the two portions are sufficiently set, a bandage is applied around the ankle to join them, the hardened collar enabling one to exert all the force in correction that is desirable.

A distinct advantage of the cast is that it may be left undisturbed for from four to six, or even eight, weeks, depending upon the cleanliness of the patient, thus affording the most perfect conditions for retraction of lengthened tissues; after two months the foot will usually be found in condition to permit the application of a short cast or of a simple retention splint.

In suitable cases over-correction may be advantageously maintained by adhesive plaster strapping after the method of Jones* (Fig. 7): while the foot is held in a position of extreme dorsal flexion and eversion, a strip of adhesive plaster is applied in a circular manner around the fore part of the sole and the back of the ankle. A somewhat smoother application may be made by using separate strips for each side; the extreme position being maintained, the first strip is carried from the inside of the great toe joint outward under the ball of the foot, and then upward above the outer malleolus and across the back of the leg; a second strip is applied in a similar manner on the opposite side; a third strip may also be used overlapping the first but nearer the heel. Jones' simple method has yielded me most excellent service in maintaining the extreme degree of over-correction desirable before the walking period, and I can heartily recommend it.

Where the degree of correction attained is not sufficient to permit the use of this method, or when the walking period has been reached, the following technique may be used: with the foot held in the best position, a strip of adhesive, about one and a half inches wide, is carried from the inside of the great toe joint outward under the fore part of the sole and then up the outside of the ankle and the back of the calf; a second strip is started in a similar manner, overlapping the first, but is carried across the front of the ankle and up the inside of the leg; the two strips are then bound down to the ankle by a circular strip passing two-thirds

*Jones (*British Med. Journ.*, 1909, p. 1065).

of the way around the leg. (See also Soule's method, *Amer. Jour. Orth. Surg.*, Vol. VIII., No. 4.)

After the foot shows a tendency to maintain the over-corrected position, constant retention may be discontinued and recourse had to the use of a simple splint during the night and for a varying period during the day, to massage, and to manipulation by the attendant. Where treatment has been instituted early, I have not found it necessary to use complicated club-foot shoes, but have secured most satisfactory results from simple appliances, such as that of Schapps.* (Figs. 5 and 6.) Full freedom of the foot is permitted for a gradually increasing period. Massage, chiefly kneading, is practised by the mother or nurse once daily and manipulation twice daily. Any tendency to relapse may be promptly met by short periods of adhesive strapping. Usually by the fourth to the sixth month the foot retains the corrected position easily, the mother has learned the rules for home treatment, and visits may be reduced to one or two a month.

Stage of Supervision.—Supervision must be continued from the time the foot easily retains the corrected position until its use in walking has demonstrated the permanency of the cure. During this time massage and manipulation, and the use of the night brace are continued. Development of the peroneals may be favored by causing the child to abduct the foot through tickling the sole and through games. A close watch must be kept for any signs of relapse.

When walking is begun, special attention must be paid to securing proper shoes. It may be advisable to thicken the outside of the heel or sole, or both, although in many cases I find that the patients walk much better in a very soft shoe, such as a moccasin.

Treatment of Cases Presenting During the Latter Months of Infancy.—The nearer the walking period, the more one is inclined to adopt the method of choice for the older cases, namely, forcible correction under an anesthetic with the application of a plaster-of-Paris cast, since it is important that the foot should be in a corrected position before walking is begun. The same method is preferred in the younger cases coming from a distance that are unable to devote the time required for gradual correction.

*Schapps (*Northwestern Medicine*, Vol. VI., No. 11, 1908).

ON THE MANAGEMENT OF CHILDREN PREDISPOSED TO NERVOUSNESS.*

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Whether a person becomes nervous or not depends upon two great factors: (1) the constitution which he inherits from his parents and through them from his ancestors generally; (2) the influences to which his body, especially his nervous system, is exposed during life and particularly during childhood. There will always be differences of opinion among serious students of the subject as to the relative importance of these two factors; some assume that heredity or nature is the all important factor; others maintain that this is relatively insignificant and that environment or nurture accounts for everything; both views are one-sided. Both nature and nurture are of fundamental importance and only by considering the two aspects of the subject fairly can sound ideas ever be arrived at.

Heredity and environment overlap in one period of life; during early childhood the individual is usually under the educational influence of his parents and exposed to their example. Doubtless much that is sometimes attributed to direct inheritance is really due to the influence after birth, of imitation of the parents. Where the heredity is notoriously bad, it might be well, as Oppenheim¹ suggests, to protect children, who have the ill-fortune to be born under such conditions, from the dangers of psychic infection in the parental environment; such children taken away from home and placed under more favorable conditions would have a better chance of counteracting the faults of inheritance.

In families in which nervous states prevail, it is a matter of great interest to know in how far the nervous tendency can be overcome by educational means and especially to learn what to avoid because of its likelihood to injure the nervous system. Even in families in which no nervous taints exist in the parents or near relatives, the children sometimes become nervous through faulty education and there is a growing desire on the part of well-informed people nowadays to make sure that the means of education they provide for their children shall be such that the nervous system will be protected and strengthened rather than exposed to overstrain and injury.

*Read before the Public Health Congress of the Medical and Chirurgical Faculty of Maryland, February 10th, 1911. This paper will also be published in the *Bulletin of the Medical and Surgical Faculty of Maryland*.

One fact, which has become ever clearer as medical knowledge has advanced, concerns the nutrition of the child. Faulty feeding in infancy and early childhood may lead to such impoverishment of the tissues and such stunting of growth that the ill effects can never be recovered from in later life. A considerable proportion of the intellectual and moral inferiorities among our people is fairly attributable to imperfect nutrition at this early age. Fortunately the public is now being so thoroughly educated to the importance of breast-feeding for infants and of liberal and suitable diet during the early years of life, by family physicians and also through the excellent little manuals of Holt,² Starr,³ Griffith⁴ and others, on the care and feeding of children, that it is not necessary to dwell at length upon the subject. Plenty of good, simple food, including milk, meat, vegetables and fruit, with avoidance of condiments, coffee, tea and alcohol is approved by all authorities.

Many parents make the mistake of allowing the caprice of the child to influence its diet. We now know the foods that are suitable for children, and, knowing these, the children should be provided with them in suitable amounts and should be required to eat of them, largely independent of choice. The child that learns to eat and digest all wholesome foods and who is not permitted to cultivate little food antipathies makes a good start and avoids one of the worst pitfalls of life with which medical men are very familiar, namely, a meticulous anxiety concerning the effects of various foods, all too likely to develop into a hypochondriacal state.

There is a greater recognition now than formerly, also, of the fact that children should not be too tenderly brought up—that a certain amount of judicious hardening of the body is desirable. While faddists and extremists in this direction fall into grievous errors, making their children go barefoot and barelegged in the snow and compelling the feeble, non-reacting child to take plunges in ice-cold water, a still greater mistake is made by those who over-protect their children and who fail to accustom their bodies early to cool baths and to exercise in all sorts of weather.

The child who is brought up in such a way that he is very sensitive to slight changes in temperature is bound to suffer from it sooner or later, and everyone is familiar with those who grumble at the weather. If children be suitably dressed and are early accustomed to taking a cool bath in the morning and to walks out-of-doors every day, rain or shine, and whether it be cold or warm, the skin and nervous system quickly acquire a tolerance for variations in temperature most desirable for health and for the feeling of well-being.

An out-of-door life for children also leads them unconsciously to exercise their muscles more than is possible for the child who stays indoors. Not only physicians, but also laymen from the old Greek times to the present have been impressed with the importance of bodily exercise and harmonious muscular development for the welfare of the mind and of the

nervous system. If we wish our children to be strong, energetic and courageous, if we desire to insure them against the nervous ills which follow in the wake of debility, inertia and timidity, we must see to it that all the muscles of their bodies are systematically and regularly exercised. For this purpose the plays of children are very important and the only child, deprived of the companionship of brothers and sisters, unless pains are taken to supply other playmates for him, is much to be pitied. Besides play, walking, running, rowing, riding, swimming, paddling and sailing are all desirable forms of bodily exercise. In cities, and especially during the school year, systematic gymnastic exercises, calisthenics, have to be resorted to and where no suitable gymnastic exercises can be obtained, parents will do well to teach older children some forms of exercises to be taken in the early morning. One of the best of the various systems worked out is that of a Dane, one J. P. Müller⁵ who, in his little book, "My System," outlines a series of exercises which anyone may carry out in his own room without apparatus. These exercises are physiologically well-devised, and I can recommend them heartily, not only for older children, but also for both men and women who have to compress the exercises of the day into a very short period. The exercises recommended in this country by Luther Gulick,⁶ by Tait McKenzie,⁷ and others may also be mentioned. I would call attention also to the works of Lagrange.⁸

An anxious mother will often ask to have her nervous child excused from regular exercises at school. This is usually a mistake, for nervous children even more than normal children, require systematic muscular exercises. It should, of course, be properly regulated, and where there is any doubt as to the reliability of the supervision of such work at a school gymnasium, definite instructions should be obtained from the family physician as to the character and amount of exercises to be undertaken.

While emphasis is thus laid upon suitable bodily exercise for children predisposed to nervousness, a warning should be sounded against excesses in sports like tennis, foot-ball, basket-ball and other games in which there is opportunity for competition or rivalry. Over-ambition in these directions is often most harmful both to the body and to the mind of the child and should be especially avoided where there is any neuropathic taint.

In addition to the hardening of the body, the education of the child should include measures which increase the resistance of the child against pain and discomforts of various sorts. Every child, therefore, should undergo a gradual process of "psychic hardening," and be taught to bear with equanimity the pain and discomfort to which everyone sooner or later cannot help but be exposed. What I have said about clothing, cold baths, walking in all weather and at all temperatures, play and exercise in the open air, has a bearing on this point, for a child who has formed good habits in these various directions will have learned many lessons in the steeling of his mind to bear pain and to ignore small discomforts.

Physicians who work among nervous cases realize how often the child who has been too much protected from pain becomes the victim of nervous break-down later in life. I have seen many a woman who could bear great sorrow or suffer without flinching the pain of childbirth, who still had no tolerance for the little ills of life. In such cases, it is the idea rather than the sensation from which the patient suffers, and such abnormal ideas most frequently arise in those who have not learned in childhood to bear pain well or to adjust themselves without complaint to the disagreeable sensations and experiences which are essential to a normal bringing up.

The boy, who learns to tumble in a gymnasium, to stand the pain of boxing and fencing and wrestling and to keep his temper while engaging in these exercises, will have subjected himself to a training which cannot help but stand him in good stead later on in life. One reason why women are more prone in later life to nervousness than men, may lie in the lessened opportunity which girls have for bodily and psychic hardening in the games which they play and the life which they lead as children. Particular care should be taken with young girls who show any tendency to nervousness to see to it that not too much concession is made to their likes and dislikes. Nothing can be more harmful to them than the gratification of caprice. Especially when a child shows a tendency to be nauseated by certain smells and tastes and to complain of noises or of sensitiveness to bright light, the family physician should be consulted and, provided no actual disease of the sense organs or brain is responsible, the process of psychic hardening should at once be begun.

Neglected, it is surprising to what vagaries such hypersensitiveness may lead. A lady recently consulted me on account of a most distressing state, asking that "in the name of mercy and pity" she should be given some help and told how to overcome an obsession which distressed her. The sound of her husband chewing at table completely upset her, and when he smoked, the noise made by the puffing of the smoke was torture to her; the creaking of her mother's shoes as she walked about the house made her most uncomfortable during a period of several months. Obviously the abnormal idea in such a case caused the suffering, not the sensory impulse itself.

Another patient, a gentleman, who has had repeated nervous break-downs, told me that they always begin in the same way. After a night of insomnia he will suddenly become unable to bear a strong light, and in lamp-light he complains that he has a sensation of pressure in the head and an inability to relax his limbs. He feels at such times as though he will lose his mind and that he must have some relief or he will have to end his life. In one of these attacks in early life, he stayed two years in a dark room and only at the end of that time would consent to remain in the light. Obviously here, too, it was not the sensation of light but the idea that the light would injure him which was the kernel of his condition.

Examples like the two just mentioned could easily be multiplied, but they will be sufficient to indicate the direction in which the psychopathic nervous system may easily tend. While in severe cases like these just referred to, the patients undoubtedly started out in life with abnormal nervous systems, it is quite conceivable that a judicious hardening in early life might have prevented the later shipwreck. I cannot too strongly recommend, therefore, the acquisition of tolerance of disagreeable feeling-tones as early as practicable in life.

If children can be brought to behave normally in the presence of the disagreeable feeling-tones just discussed, the task of educating them to control themselves in circumstances which tend to arouse the stronger feelings, emotions and passions will be made much easier. Parents and nurses are too little aware of the dangers of allowing the emotions or passions to go unbridled. The problem should be recognized and attempts at the beginnings of its solution should be made in early infancy. If a young infant be kept in a normal routine, despite any emotional outbreak which it may manifest, an excellent start in the training of the emotions will have been made. If a child learns, that, by crying or by an exhibition of temper, it can gain the thing which it thinks desirable, otherwise unattainable, a very bad start will have been made. Children should early be given to understand that they must control themselves before their desires will be gratified. How often has an indulgent mother given a child something it has asked for in order to stop its crying and to avoid a scene! It is hard to imagine anything, in the circumstances, worse for the child. If, instead, the mother had ignored the temper and told the child that it must say "please" and must wait a few moments after its temper has been controlled and the request has been made before the desire will be gratified, it would have been quickly possible to convince the child that it can get things by controlling itself rather than by emotional explosions. The substitution of self-mastery for emotional outbreaks is easy when begun early, but very difficult, indeed, well-nigh impossible, if begun late in life.

Another mental attitude that bears watching is the craving of the child for sympathy. Parents are really unkind in yielding too much to such a craving. True kindness will teach the child to rely more upon self-help.

Still another manifestation, common in children and fostered too often by the example of the parents, is vacillation. In one form of functional nervous disease indecision is a most prominent symptom. Parents should see to it that children are not exposed to a pernicious example in this regard. While there are some children of the "hair-trigger" type, who have to be taught deliberation in the making of decisions, there are more who have a tendency to doubt and indecision and who should be taught that it is better, after due consideration, to make a decision, even though it be wrong and to stick to it, rather than to remain undecided.

The extent to which the fallacy of indecision may be carried is well manifested by some of the psychasthenic patients who apply to physicians for aid. Their indecision is often shown by the way in which they make an appointment with the physician, making and breaking it several times or changing the hour repeatedly before finally appearing in his office. One of these patients told me that it sometimes took him hours to decide what clothes to put on for the day. Fortunately, such pathological cases are uncommon, but there is every gradation from the milder symptoms of vacillation to the outspoken and distressing indecision of the confirmed psychasthenic. The old motto "When in doubt, act," should be kept in mind by parents who note a tendency to indecision in a child.

The control of the stronger passions is for some easier than the mastery of ordinary irritation, and nervous children should, both by example and by precept, be taught how to stifle irritability whenever it arises. So few adults have learned how to meet the daily friction that there would seem but little chance as yet for the nervous child constantly exposed to a bad example. As an observant writer has said, "an important feature of the art of living consists in keeping the peace, the whole peace and nothing but the peace with those with whom one is thrown."

If parents are prone, in their daily lives, and especially within hearing of children, to blame the people who surround them or the people about whom they talk, they may often, quite unconsciously, sow the seeds of malevolence in young minds. Just as cheerfulness and kindness are contagious, so, unfortunately, are moroseness, acerbity, churlishness and ill-will, and the latter are mental states which are most harmful to the nervous system. It is entirely possible, with long training, practically to banish anger, worry, irritability and uncharitableness from one's life. You will be impressed with the passage in Arnold Bennett's book, *The Human Machine*,⁹ which deals with the matter of blaming, of judging others, and emitting verdicts upon them. You may not agree with him, but he will make you think, at least, when he says: "All blame, uttered or unexpressed, is wrong. I do not blame myself. I can explain myself to myself. I can invariably explain myself. If I forged a friend's name on a cheque I should explain the affair quite satisfactorily to myself. And instead of blaming myself, I should sympathize with myself for having been driven into such an excessively awkward corner. Let me examine honestly my mental processes, and I must admit that my attitude towards others is entirely different from my attitude towards myself. I must admit that in the seclusion of my mind, though I say not a word, I am constantly blaming others because I am not happy. Whenever I bump up against an opposing personality and my smooth progress is impeded, I secretly blame the opposer. I act as though I had shouted to the world: 'Clear out of the way, everyone, for I am coming!' Everyone does not clear out of the way. I did not really expect everyone to clear out of the way. But I act, within, as though I had so expected. I

blame. Hence kindness, hence cheerfulness, is rendered vastly more difficult for me.

"What I ought to do is this! I ought to reflect again and again, and yet again, that the beings among whom I have to steer, the living environment out of which I have to manufacture my happiness, are just as inevitable in the scheme of evolution as I am myself; have just as much right to be themselves as I have to be myself; are precisely my equals in the face of Nature; are capable of being explained as I am capable of being explained; are entitled to the same latitude as I am entitled to, and are no more responsible for their composition and their environment than I for mine. I ought to reflect again and again, and yet again, that they all deserve from me as much sympathy as I give to myself. Why not? Having thus reflected in a general manner, I ought to take one by one the individuals with whom I am brought into frequent contact, and seek, by a deliberate effort of the imagination and the reason, to understand them, to understand why they act thus and thus, what their difficulties are, what their *explanation* is, and how friction can be avoided. So I ought to reflect, morning after morning, until my brain is saturated with the cases of these individuals. Here is a course of discipline. If I follow it I shall gradually lose the preposterous habit of blaming, and I shall have laid the foundations of that quiet, unshakable self-possession which is the indispensable preliminary of conduct according to reason, of thorough efficiency in the machine of happiness."

The growing child will nearly always find himself confronted by a sufficient number of disagreeable excitations to give him opportunity for the cultivation of emotional control. It is not desirable that life should be arranged otherwise for him; it would be far from advantageous to him to be protected from everything tending to stir his feelings and emotions. Attempts to follow the founder of Buddhism in the idea of educating youth by suppressing desire and keeping the individual from the sight of suffering, care or sorrow, would lead to a race of weaklings insufficient for the struggle of life. Far better, as Ziehen¹⁰ and Oppenheim recommend, purposely to expose the neuropathic child occasionally to opportunity for slight emotional outbreak in order that he may by a sort of "gymnastic" of the emotions gradually learn to be master of himself.

The sensitive nervous system, if over-protected in the early years, suffers keenly when later on the principle of protection has, perforce, to give way to the principle of exertion. A lady of great refinement, who, owing to an illness which necessitated hospital treatment, was unpreparedly made aware of the world-pain which exists and of which she had previously known but little, owing to her mode of life, once told me how the sudden contact with suffering humanity affected her. "I saw and heard so much that distressed me, that *all life seemed to be an open wound*. * . * I used to lie awake all night, thinking about what

I had seen or heard or suspected during the day, and *I thought I should go mad* because I could do nothing to stem that rising tide of misery and corruption." Fortunately, she was made of excellent stuff and so profited by the chastening experience that, on recovery, she joined a group of enthusiastic social workers and now labors earnestly to improve human conditions in the city and state in which she lives.

Special care should be exercised to prevent disagreeable feelings and emotions becoming transformed into the more persistent moods. It is often better for an emotion to discharge itself in the form of some definite act and thus bring it to an end rather than through the partial suppression of it, have it last in the form of a disagreeable mood, for a considerable length of time. Pouting, sulkiness, harboring a grudge, or bearing malice, should be regarded as symptoms seriously to be considered and corrected, for if they be tolerated in the child, habits may be begun which will prepare the soil for the development, later in life, of the seeds of enmity and suspicion; the full grown plants are the persecutory ideas of the paranoiac states.

How to manage a child in a fit of temper has been much discussed. When possible it is desirable to cut it short at the beginning. Some parents rejoice to see their children reveal a violent temper, and are glad that they can fly into a passion, turn red as a beet, clench the fists and attack the individual with whom they are angry. Such attacks, if frequently repeated, are very deleterious to the nervous system. Some parents try to stop them by petting or indulging the child, a kind of licensing of irritability which rarely, if ever, pays; others threaten the child or corporally punish him, a mistake, usually in the other direction. As a rule, most may be accomplished by purposefully ignoring the attack, perhaps isolating the child for a short period; in some cases a warm bath and the bed may be the best remedies! In older children the habit of giving way to temper may sometimes be broken by inculcating the conviction that one who loses his temper makes a fool of himself, loses his dignity and excites the disdain and contempt of his fellows: the horror of looking ridiculous, of making a donkey of oneself, may be a most powerful lever in conquering a tendency to attacks of fury.

All children are easily frightened, but the child predisposed to nervousness, more easily than the healthy child, becomes the victim of abnormal fears or timidity. The Italian physiologist, Mosso, writing on "fear"¹¹ once said: "Every ugly thing told to the child, every shock, every fright given him, will remain like a minute splinter in the flesh, to torture him all his life long." In Greece and Rome the children were frightened with the lamias or female demons, who would charm them and suck their blood, with the one-eyed Cyclops or with a black god, Mercury, who would come to carry them away. And this very pernicious error in education still prevails. The mother, the nurse, the maid and the servants still frighten the child with tales of the bogey-man, of goblins,

of ogres, of wizards and of witches. How often is a child frightened to tears, its disposition spoiled and its life made a burden by tales, threats or tortures which make it timid and shrinking; sometimes fears are thus started which last through life. One must learn how to deal with the fear of being alone, the fear of the dark and the fear of thunder and lightning. Certain fears, common to childhood, are easily overcome, especially through the example of courage set by parent, nurse or teacher.

In some instances, however, the fears are a symptom of disease and when there is doubt a physician should always be consulted. A young girl, recently brought to me, because of an unaccountable, persistent, and distressing fear of "burglars in the house," was found to be suffering from exophthalmic goitre; on removal of a portion of the thyroid gland by Dr. Halstead the child rapidly improved, and on last report was only occasionally troubled by the fear; it seems probable that she will soon be entirely free from it. Children who suffer from "night terrors" often have adenoid growths in the nasopharynx; on removal of the growth by a slight operation, the "night terrors" disappear.

In his book¹² entitled *The Natural Way in Moral Training*, Patterson DuBois emphasizes the importance of what he calls "nurture by atmosphere," by which he means the indirect education of the feelings, and John Dewey¹³ asserts that "the feelings and sentiments are the most sacred and mysterious part of the individual, and should always be approached and 'influenced indirectly.'" More can be accomplished by the setting of good example in enthusiasms, depreciations, reverence, and admirations, than by direct preachings.

Let no one think, however, that lack of feeling, or a nature impoverished on the emotional side is desirable, or that it protects against nervous disease. The elevating emotions, hope, joy, expectation, love—are constructive and are judiciously to be cultivated; the depressing emotions—despair, sorrow, regret and fear—are damaging to the nervous system if long maintained. The highest feelings of all, including the religious, the ethical and the esthetic—inspire noble and useful conduct, and in the education of nervous children these sentiments are to be favored in their development, in due degree, at a suitable age.

It is a serious mistake to lead the young child into experiences that belong properly to a later age. When children under ten years of age are made to travel extensively, to visit museums and picture galleries, to attend the theatre and the opera, they are introduced to entertainment wholly unsuited to their time of life and which they, in their immaturity, are entirely unfitted to enjoy. Later on, at an age when they should learn to know such things for the first time, the attractiveness of novelty is wanting; they are cheated of the pleasures which normally should be theirs. As Oppenheim well puts it, a "child's childishness is its greatest asset."

On the training of the religious, ethical and esthetic feelings, time will

not permit me to speak, though I regard the topics of the greatest importance for the health of the nervous system. Certainly, the cultivation of the love of nature, of truth, of goodness, of beauty, and of humanity, cannot help but strengthen the character and the will. The altruistic feelings, when they begin to appear, should be given opportunity for expression.

Above all, as a factor making for the health of the nervous system, the joy of work¹⁴ must be referred to. It is one of the greatest pleasures life offers; moreover, it compels concentration of attention, and protects from all the dangers which attend upon idleness. "Education to idleness is education to nervousness." Overwork must be avoided; neither bodily or mental fatigue should be permitted in excess. Regular, systematic, enjoyable work, suited to the interests and powers of the worker, is the best tonic I know of. If the work can be in the country, rather than in the city, all the better, especially for those with nervous predisposition. The enjoyment of nature possible in the country, the opportunities for work in wood, field or garden and upon the river, keeping the worker much in the open air, exercising his muscles, drawing his attention away from himself and fixing it upon things outside—what conditions could be more favorable to the health and happiness of the nervous child. If the nervous children that we see in towns could be transplanted to villages and the country—away from the din and bustle of the city, its restlessness, its haste and its feverish excitements, what a host of advantages would accrue! The schools are growing ever better in the country; in many country districts they are now excellent. The movement which began with the New School of Dr. Cecil Reddie¹⁵ in Abbotsholme, England, and which has led to the Landerziehungsheime of Lietz¹⁶ in the Harz and in Thuringia, and of Trueper¹⁷ near Jena, should be followed and imitated in this country.

In any case, nervous children should not be sent to school too early; preferably they should start a year or even several years later than the normal child. And in the schools they should never be pushed ahead too fast; competition is dangerous for the nervous child. The mistaken ambition of parents who desire their children to head the class is often responsible for serious injury to health.

Sleeplessness is always a dangerous signal. In children it is most often due to indigestion or to mental overstrain; occasionally to premature sexual excitations. If insomnia appear and especially if it persist the parents should consult a physician.

Medicine, psychology and pedagogy are all concerned in solving the problem presented by the nervous child. These sciences have already made great conquests; what the future may hold for them, who will attempt to foretell? Let us avail ourselves of the knowledge we have, doing what we can to dispel the scepticism of the ignorant and at the same time avoiding the futile enthusiasm of those who believe they know all.

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CHRONIC HYPERSECRETION.*

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At the outset I desire to emphasize, as a cardinal point, the necessity of viewing every patient with chronic hypersecretion as an initial case of gastrectasis; also, to stress the fact that the primary cause of the hypersecretion be carefully looked for with the object of instituting early and proper treatment. By this means, we minimize the possibility of dilation of the stomach, which is likely to supervene if the primary disease is located at the pylorus, and is neglected. That intermittent, or periodic hypersecretion is, at times, due to a nervous affection is true—but chronic hypersecretion, never; it is “merely an expression of an organic lesion of some part of the digestive tract, or of those organs that pour their secretions into it.” The conditions most often responsible for this perversion of secretion are ulcer, erosions or fissure at the pylorus, acid gastritis, and hyperacid alcoholic gastritis.

Of conditions external to the stomach which sometimes are associated with hypersecretion may be mentioned diseases of the gall-bladder and appendix.

The onset of the condition at times is insidious, coming on with slight attacks of pains (called hunger pains) before food. Again, a slight uneasy sensation occurs one or two hours before meals, these phenomena often existing for months or years before the true condition is recognized. The initial attack of pain in some instances resembles biliary colic, which it sometimes proves to be. Hypersecretion often appears abruptly, coming on after some indiscretion in diet or drink, and calling the patient's attention to his disordered stomach in no uncertain terms. Nocturnal pain is also a symptom which is first noticed by some patients, and is that which causes many to consult a physician. These pains are almost invariably produced by hypersecretion, as is also nocturnal vomiting. The above symptoms should always put the physician on the look out for hypersecretion. The less obtrusive symptom of distension without much, if any pain, if not closely looked into, is likely to mislead the physician into making a wrong diagnosis, *i. e.*, flatulent or nervous dyspepsia, or amylaceous indigestion. As it is in hypersecretion caused

*A lecture delivered at the New Orleans Polyclinic.

by a diseased appendix that this symptom is most often met, the failure of alkalies to give relief should at once direct the attention of the practitioner to the appendix.

Many other symptoms are often met with in hypersecretion, but they are also common to other conditions, and for this reason I will not enumerate them.

DIAGNOSIS.

The only way of making a positive diagnosis of hypersecretion is by examination of the fasting stomach by means of the stomach-tube, and the obtaining of more than 30 c.c. of gastric juice, usually of an acidity of from 70 to 110. If there is no retention of food the fluid is clear, straw-colored, slightly milky, or bile-tinged. If particles of food are present in the fasting stomach after a mixed meal the evening previous, the particles almost always prove to be starch granules, the meat fibres being more likely to have undergone digestion in the acid gastric juice. Before the diagnosis is complete, it will often be found necessary to wash the stomach clean the night previous to withdrawing the stomach contents the next morning, thereby enabling the physician to determine whether gastrectasis is already established.

In arriving at a conclusion as to the cause of hypersecretion, *tabes dorsalis* must not be overlooked.

TREATMENT.

Treatment is always to be directed towards the cure of the primary disease. If the underlying cause is ulcer, erosions or fissure at the pylorus, acid gastritis or hyperacid alcoholic gastritis, proper hygienic, dietetic and drug treatment proves effective in a large percentage of cases when it is early instituted and intelligently persisted in. Tobacco in excess must be discontinued. Alcohol in all forms is interdicted. Gormandizing is to be curbed, and the use of condiments and fried food prohibited. Patients who have indulged in any of the above ways, more especially if the primary disease is an acid gastritis, or ulcer, erosion, or fissure of the pylorus are benefited by hot Carlsbad or Vichy water before meals, and the administration of alkalies after eating. When the bowels are regular, I give preference to bicarbonate of soda; when constipation exists, *magnesia usta* is used; and, if diarrhea is a complication, precip. carbonate of lime, ammonio-magnesium phosphate or carbonate of bismuth is employed. At times a combination of alkalies will prove more satisfactory than when given separately. White of raw egg will often prove effective in controlling pain. Should the pain prove annoying, menthol gr. $\frac{1}{4}$ and spirits of chloroform 20 to 30 minims diluted with

water are to be given every four hours; or atropine in suitable doses may be given in conjunction with the alkalies after food. If the above fails to give relief, morphine can be resorted to. If flatulence becomes a troublesome symptom, spirits of turpentine gtts. x-xv., or the same amount of glycerin carbolic acid, proves helpful. To avoid many of the symptoms which are incident to chronic hypersecretion, methodical lavage should be practised. When vomiting occurs at night, or when food is found in the fasting viscus early in the morning, the stomach should be washed at least once daily. If sleep is disturbed this is best done at night before retiring. In cases of marked muscular insufficiency, it may be necessary to wash the stomach again in the morning, or during the day. For the purpose of lavage, I give preference to bicarbonate of soda, teaspoonful to quart of warm water 100° to 105° F. At times, I use a solution of argyrol (1/250) of the same temperature, allowing it to remain in the stomach five to eight minutes. In cases of dilated or dislocated stomach, I have found strapping the abdomen with rubber adhesive plaster preferable to the abdominal supporter.

DIET.

The diet should be non-stimulating, bland in character, of moderate amount, and preferably semi-liquid. While for obvious reasons it is not well to exclude amylaceous substances from the dietary, they must be allowed only in small amounts. Dextrose, or full doses of extract of malt often agree well. Cooked asparagus and cauliflower and stewed celery may be taken in moderation. Of animal foods, small quantities of veal, sweetbread, calves or sheep brains plainly cooked, also boiled or baked fish, may constitute part of the diet. Two or three teaspoonfuls of unsalted butter, and almond or olive oil may be taken at meal-time. Whole raw eggs are well tolerated; or the white portion, either alone or mixed with milk, is a valuable article of food in this condition. In case the milk disagrees, whey or Horlick's Malted Milk may be substituted for a time.

If the hypersecretion is dependent on disease of the appendix, alkalies have little or no effect in relieving symptoms; and in fact, should subacidity exist, as it often does, alkalies may cause distress. The hypersecretion in the instance of a diseased appendix usually persists until the troublesome little fellow is removed, when the condition soon abates. Should gall-bladder disease be present, suitable medication must be instituted. Upon this failing to give relief, the patient is to be placed in the charge of a competent surgeon. I have seen the condition of hypersecretion to persist when cholangitis or cholelithiasis existed until proper surgical attention was given them. Thereupon, and thereafter, the patients were free of all symptoms of hypersecretions.

If the more serious condition, cancer of the pylorus, exists the case is always necessarily surgical. When gastrectasis is once fully established the case assumes a new phase with which it is not my purpose to deal at present.

The prognosis is to be made according to the primary disease responsible for the hypersecretion; and also according to the patient's ability and inclination to follow proper treatment.

The patient I here present to you is thirty-two years of age, and under-nourished. A cigarette smoker, he uses 20 to 30 daily. He does not use alcohol, and denies syphilis. His physician advised him to consult me for a derangement of the stomach, which has persisted for eight or ten years. He complains of pain which comes on usually about three-quarters of an hour after food, and continues for some time. Two months ago, he vomited chocolate-colored fluid (blood), which occurred on two occasions several days apart. At this time he also noticed that his stools were tarry. Pyrosis is marked at times. Nocturnal pains and vomiting occur occasionally. For some time past, his stools have been scant and hard.

Inspection shows an inclination to the habitus enteropticus. Deep pressure over the pylorus causes pain; otherwise, the abdomen appears clear. Lungs are normal. On examination of the heart, a slight accentuation of the second aortic sound is heard. Arteries are normal. On examination of fasting stomach, 500 c.c. of straw-colored fluid containing a few starch granules were obtained. This fluid had an acidity of 110. Two other examinations were made, the stomach having been washed clean the night previous. In one instance, 120 c.c. and in the other 100 c.c. of slightly milky fluid were obtained in the morning, both showing acidity of 100. The fluid obtained on the three occasions was examined for occult blood, but proved negative. Two examinations of urine showed diminution of chlorides and increase of urea. The examination of the feces was negative as to blood. Blood picture is that of secondary anemia. Capacity of stomach is 1,600 c.c. Food is never vomited.

Diagnosis.—Spastic stenosis of the pylorus, with hyperacid hypersecretion.

TREATMENT.

Smoking has been interdicted, and he promises to stop. Rest and quiet are advised. Methodical lavage with quart of warm water containing a teaspoonful of bicarbonate of soda was suggested before retiring, if nocturnal pain and vomiting should recur; otherwise the lavage was to be practised in the morning before breakfast. The following prescription was ordered to be taken after meals:—

Pulv. rad. rhei..... ℥ i.
Sodii bicarbon. ʒ ii.
Magnesia usta. ʒ iiss.

M. et. ft. pulv.

Sig.—Half-teaspoonful in water after meals.

Atropine may be given along with the alkalies after food. For the pain, menthol and spirits of chloroform were prescribed. Should this fail to control the pain, morphine in conjunction with the alkalies is to be given. The diet advised for the present is to consist chiefly of whites of eggs, milk, cream, olive oil, and salt-free butter. If his condition continues to improve, the diet is to be made more liberal; but should food stagnation prove troublesome, a competent surgeon is to be consulted.

PERINEAL PROSTATECTOMY; ITS PRELIMINARY TREATMENT AND AFTER-CARE.

By JOHN R. CAULK, M. D., of St. Louis.

During the last decade, great advances have been made in the treatment of prostatic obstruction and remarkable results have been reported, showing a gradual improvement in the results obtained and a decided decrease in the mortality rate. The question arises, How has this satisfactory condition of affairs been produced? The answer involves several factors. First, a more careful and more refined diagnosis of the local conditions and of the existing complications. Second, the institution of appropriate preliminary treatment which tends to ameliorate these conditions and to render the patients in a much better physical condition before operation. Third, improvement in operative technique, and lastly, a vigilant post-operative care.

There is probably no operation in surgery which requires a more careful attention to detail or more accurate knowledge of when to operate than does prostatectomy. Most of the patients are old men and a great majority present some or all of the usual senile manifestations, such as cardio-vascular derangements, pulmonary complications, and various grades of renal depletion, and it is essential that these be corrected and that every possible strain be taken from these deficient organs. The improvement in diagnosis has been chiefly in recognition of complications which are in need of preliminary treatment before operation and in the more careful rectal and cystoscopic examinations. The prostate should be accurately outlined per rectum, noting its size, shape, and consistency, the condition of the seminal vesicles, the intervesicular plateau, etc., in order to determine the exact involvement, remembering always that prostatic carcinoma occurs in about 15 or 20 per cent. of such cases. Following this careful rectal examination, a thorough cystoscopic examination should be done, residual urine and bladder capacity should be accurately determined, the nature of the intravesical prostatic enlargement accurately pictured, and the condition of the bladder as to diverticula, stone, and tonicity closely observed. A total twenty-four-hour urinary output should be examined chemically and microscopically, urea and total solid determination made, and functional tests for combined renal activity done. A general physical examination, paying strict attention to the heart, lungs, and vascular system, is essential, and, if these are found deranged, they should be treated by proper therapeutic regime.

Having done this, one has a substantial foundation on which to work and can prepare his patients in a satisfactory manner for the operation.

The renal condition in patients suffering with prostatic obstruction is the most important to determine, and the one which has received far too little attention and has been the chief factor in the higher mortality in the past, after prostatectomy. The recognition of the importance of the renal condition in these cases and the adoption of proper preliminary treatment in its behalf, have done more to advance prostatectomy and to bring the operation into the domain of safety than any of the other contributory measures.

After a protracted obstruction at the vesical orifice, marked alterations take place in the urinary tract. There develops a gradual increasing residual urine with distension of the bladder, dilatation of the ureters and renal pelves, pressure atrophy of the renal cortex with its resulting hydronephrosis and, if infection supervenes, pyonephrosis or pyelonephritis, which adds to the gravity of the condition.

Frequently these conditions are overlooked, as, clinically, these patients may seem good surgical risks, presenting no clinical signs of renal disturbances, with a good twenty-four-hour output of urine of good specific gravity, urea and total solids, though they may be on the verge of renal failure. Their kidneys are secreting under tension, as a result of the back pressure, and if this is suddenly removed as by a prostatectomy, they are compelled to work under an absolutely different atmosphere and are often unable to adjust themselves to circumstances, and consequently cease secreting, the patients becoming uremic; some to recover only after stringent measures, others to meet a fatal issue in spite of all treatment.

Frequently one hears surgeons say that they are not afraid to relieve a man of a distended bladder and have seen no untoward effects resulting from it. This is perfectly true, but the conditions are not the same after a catheterization removing all the urine as they are after the removal of the obstruction. In the first case, the urinary apparel, has, in common-place parlance, a "come-back." The alteration is temporary and the pressure soon returns to its former proportions; whereas, after the removal of the obstruction, there is no chance of any restoration of the usual pressure. It must remain relaxed and herein lies the danger.

If the obstruction has been recent, and if the residual urine is small, and if the patients have been leading a regular catheter life, even though there is complete retention, it has been found that they are not so liable to become uremic after operation. The type of case, which is the worst surgical risk, is the one which has had a long-standing obstruction associated with a high residual urine and has never been catheterized, or if so, very irregularly. This type of case is the one which is most liable to become uremic after the removal of the obstruction and is the one which should require the most careful preliminary treatment. This type

of uremia is absolutely different from the type following acute or chronic nephritis, and it is more amenable to treatment. This point has not been sufficiently recognized. I have seen quite a number of patients whom clinicians have given only a short time to live when seen in a comatose condition from a uremia of this type, and who, after a proper course of procedure, have recovered and later undergone prostatectomy and gotten perfectly well.

In determining the true renal condition in cases of this obstructive type, phenolsulphonephthalein has been a most valuable aid. In quite a large series of cases, its results have been uniform and accurate and it has been of great value in determining when the kidneys are operating in a stable manner and are capable of standing the extra strain of an operation. The test is very easily done in these cases. With the retained catheter in place, the urine is allowed to drain into the test-tube. A subcutaneous injection of the drug is given and the time of appearance noted. After this, the catheter may be corked, patient be up and about, and at the end of the first or second hour, the urine collected and the comparative reading of the hourly eliminations may be made in a short time by means of the colorimeter. For a full account of the use of the drug and of the results obtained, the reader is referred to the article by Geraghty and Rowntree, in the *Journal of Pharmacology and Experimental Therapeutics* for July, 1910.

Thus, it is our aim gradually to reduce the tension under which the kidneys of such patients are laboring and to render them accustomed to secreting under a lessened and more normal pressure and to get the bladder and ureters in a more normal state. This is best done by a course of preliminary drainage, which may be by means of the retained catheter—by repeated catheterizations or by suprapubic cystotomy.

Personally, I am in favor of a retained catheter, corked and drained every three or four hours, the bladder washed through the catheter with mild bichloride or boric solution twice a day, the catheter removed every three or four days and the urethra irrigated. I have had the opportunity of studying cases of repeated and retained catheterization and the latter seemed more preferable and much more comfortable to the patient. They may remove the cork themselves, but should be instructed not to remove it too often on account of the danger of developing a contracted bladder. In this way the tension is gradually reduced. I have seen but very few cases where a catheter was unable to pass. A coudé or bicoudé will generally go. One should never use a soft-rubber catheter in these cases, as it generally butts against the obstruction, causing trauma and hemorrhage, and often invites the ordinary urethral chill. If one at first is unable to pass a catheter, at times a suprapubic puncture to relieve the congestion may make it possible for the catheter to pass. I was asked recently what I would do if I had a case with retention of urine due to a prostatic obstruction associated with an impermeable stricture of the

urethra. Off-hand, I said that I had never seen the two associated and after thinking it over, from a pure mechanical standpoint, it does not seem to me possible. For it seems that long before the stricture could become impermeable, there would be a retention due to the combination of the obstruction from the prostate and from the stricture itself; on the other hand, it seems that it would be practically impossible to determine that one had a prostatic obstruction if there were an impermeable stricture of the urethra. As to suprapubic cystotomy for preliminary drainage, in some few cases where the catheter drain is not effectual after sufficient trial, a suprapubic cystotomy under cocaine may be efficient. As a primary procedure, in cases with a high residual urine, I am not entirely in favor. It has a disadvantage of causing the same sudden transformation of affairs as prostatectomy, except the shock incident to the operation. Of course, the outflow may be controlled by regulating the drainage apparatus, but then it seems to me that we are practically doing the same thing as by the catheter, except that the drainage in this case is uphill, whereas with the catheter it is dependent. Besides causing the sudden relaxation, the patients are confined to bed, cannot gain their strength as rapidly as if they were up and about, and run the risk of hypostatic pneumonia; and if perineal prostatectomy is to be done later, it markedly interferes in the irrigation in the after-treatment. With catheter drainage, they may be up and about, keep their appetite up, their bowels in good shape, and the kidneys seem to secrete better in the upright position. Also, as Cabot has shown, the presence of a catheter on the trigone stimulates renal secretion.

Whatever procedure we adopt for our preliminary drainage, we cannot emphasize too strongly the value of great abundance of water. If the patient is able to take it by mouth, at least a glass of water an hour should be given; otherwise infusions and rectum salt should be administered. Careful attention to the bowels and to the skin is extremely important. As a rule these patients should not be put on a restricted diet, but food should be given freely. They seem to do much better on the ordinary food. Urotropin or some urinary antiseptic is as a rule necessary. This preliminary routine is carried out until the kidneys are functioning in a stable manner, as is evidenced by the quantity and quality of the urine and by their functional capacity, and until the general clinical conditions seem satisfactory. This usually takes from ten days to three weeks and in some cases longer.

So much has been written about the technique of perineal prostatectomy that I will not take your time in discussing it. The advent of the tractor brought the greatest success to the operation by making it one of direct vision, instead of a blind procedure, allowing the operator to preserve structures that were formerly injured and lessening the liability of post-operative complications. Other than this, I should say that the improvement in the operative technique has not been of as great value in

the improved statistics as has the careful preliminary preparation of the patient for operation.

The question of anesthesia is a very important one in this class of patients. Ether has been the predominating anesthetic, and the results under its administration have been very satisfactory; but owing to its renal effects in some of these gravely disordered cases, nitrous oxide has been substituted to a considerable extent and with very gratifying results. The anesthetic, well given, is thorough, the patients being perfectly relaxed, and it is really quite remarkable to see some of these old men, immediately after operation, perfectly conscious before leaving the operating room, and with none of the unpleasant effects of an ether anesthesia. I have seen practically no chloroform used in these cases, and since the work of Opie on the association of chloroform poisoning and infection, showing the marked liver changes, it should make us even more guarded than before in its use, since most of these patients are subjects of infection.

One minor point in the operation which has added greatly to the comfort of these patients has been in the manner of closure of the skin incision. All my dealings have been with the inverted V incision of the Young operation, and the incision has been closed except at the apex of the V, where the tube and gauze are brought out. Frequently with such a closure, there develops a painful granulating nodule, owing to the turning back of the apex of the V by the pressure of the tube. This has been overcome by bringing the tube out of one of the arms of the V and closing the apex tightly. In this manner, the wound usually heals with a flat surface and causes no inconvenience.

The after-treatment in these cases is more or less routine, which ordinarily varies but little except to meet some of the complications which may arise from time to time. It is of paramount importance to have trained nurses and assistants constantly present to cater quickly to the desires and needs of these patients, in order that they be subjected to no unnecessary suffering or strain. Water should be given abundantly. Immediately after returning to the room, an infusion of 1,000 c.c. salt solution should be administered, and as soon as the patient is able to take water by the mouth, it should be given freely. As a rule, after gas anesthesia, there is seldom nausea and water is very soon tolerated. The patient should be turned frequently from side to side in order to prevent hypostasis and should be propped up on a back-rest as soon as possible. Usually, by the third morning, he should be encouraged to get up and begin to move about, and in this way to gradually regain his strength. The irrigation, as a rule, should run constantly for twenty-four hours while the tubes and gauze are in place. It is unwise to stop it entirely and to flush the bladder at intervals, as there is always danger of a blood-clot causing obstruction to the tube, and, with the bladder empty, the tube is far more uncomfortable. The temperature of the irrigation should run from 110° to 120° F., depending upon the amount of bleeding, the

rate of flow varying in the same manner. If there is no bleeding, and as a rule there is but little, the flow may be diminished to a very fine stream, but should never be allowed to flow drop by drop, as at such a slow rate a clot may form and cause trouble. Just before removing the gauze on the second day, the irrigation should run faster and warmer, as the removal of the gauze at times starts a little bleeding, and with the rapid warm irrigation this is soon checked and clotting is prevented. The tube is generally removed at the end of twenty-four hours and after this the patients are much more comfortable. By using two catheters fastened together, there has frequently been leakage around the tubes and often the patients have been made uncomfortable. This has been obviated in two ways. In the first place, there is now on the market a large round two-way rubber tube which fits snugly into the orifice, and leakage seldom occurs. Other types are made mostly of metal, but these are far less satisfactory. The second way that the patients have been kept from getting wet is by the use of a large round double ring air-cushion with a drainage opening in the centre, which runs through a hole in the mattress and spring of the bed. In this way, drainage is dependent and the patients do not become saturated as they frequently did by the use of the Kelly pad, with the drainage running off at the side of the bed. The drainage in this way was, as a rule, uphill, and a large puddle of water frequently collected and had to be siphoned off.

Cathartics should be given on the second night, followed by a mild saline on the third morning. Enemas are thought to be somewhat dangerous in these cases. Young reports 2 cases of embolism following enemas and since then has advised against their usage. After the bowels have moved, the diet should be made nourishing and in a few days the majority of the patients should be put on solid food. It is generally advisable to give urotropin when the patient is on solid food. After the removal of the tubes, and the drainage is through the perineal wound, it is important that the dressing should be changed frequently, at least every two or three hours, in order to keep the patient as dry as possible. Generally by the third or fourth day, there is continence amounting from one-half to one hour, and by the end of the week, one or two hours, and the patients may be kept entirely dry by changing the dressing after each perineal urination. The wound should receive careful attention, mild boric irrigations being given several times daily. All necrotic tissue should be removed and the wound kept clean. About the middle of the second week, the anterior urethra should be irrigated, as there is often a gluing together which may prevent the urine from coming through. At the end of the second week, most cases begin to pass their urine through the anterior urethra and, by the end of the third week, the majority of the patients are voiding in the right way. If the fistula is slow in healing, it is often hurried by curetting and by the application of silver nitrate. Sounds should not be passed as they only invite epi-

didymitis, and they are never indicated, since stricture is extremely rare. The only instrumentation should be a silver catheter before discharging the patient, in order to determine if the bladder completely empties itself and to find out the bladder capacity.

With the preliminary treatment, building up the patient's general condition, getting his kidneys functioning in a stable manner, promoting free secretion by abundance of water and getting them gradually accustomed to secreting in a more normal state by preliminary drainage, and following the routine above outlined after operation, post-operative uremia to any decided extent is extremely rare, and most patients seem to be but little upset by the operation.

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SOME OBSERVATIONS ON SUBCONSCIOUS PHENOMENA.

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The most cursory glance through the annals of the various sciences reveals a most encouraging progress in the various branches of medicine. Perhaps nowhere in the domain of science have greater strides been made than in our knowledge of nervous structure and function. Interesting, indeed, is a comparison of the early 'conceptions of the functions of the nervous system with the results which later research in nervous anatomy, pathology, physiology and, finally, also in chemistry and psychopathology has achieved.

We may remember that the ancients were hardly acquainted with the brain or the cord; that they knew almost nothing of their structure, still less of their functions; and that only after many years of active speculation did the true functions of the nervous system and its relation to the "soul," or mental processes, begin to dawn upon the Greek scientific mind. The brain was originally conceived as physiologically and anatomically a purely glandular organ. Hippocrates was the first to maintain that the brain was the seat of mind. The profession in the days of Plato regarded the function of the brain as that of "cooling of the heart." Equally interesting was the idea of Erasistratus who believed that the inspired air, elaborated in the lungs passed into the heart, thence to the brain, in the ventricles of which it was converted into the so-called "animal spirit."

Finally Charles Bell discovered the motor and sensory tracts, and later investigators have further differentiated the various tracts and functions of the cord and basal ganglia. The work of Broca, Fritsch, Luciani, Hitzig, Munk, Ferrier, and others have finally established the theory of localization of function, the presence of various mechanisms for different functional activities.

Scientific research into the external aspect of the brain, and of gross localization of nervous architecture in relation to function, having reached a high state of perfection, the stream of scientific thought naturally turned to investigation into the nature of nerve elements, the cells and their prolongations. Science has made an attempt, and indeed a highly successful one, to penetrate into the hidden laboratory of cellular activity, but of the greatest importance is the fact that nerve structure and function are now being studied in a correlated sense. The results are revelations through the combined studies of the histologist, the chemist, pathologist,

and the physiologist. These were finally correlated with experimental psychic phenomena, by well-recognized psychopathological methods.

The nucleus of the pathology of mental diseases lies in the fine changes within the laboratory of the body of the nerve cell, and it remains for later scientific investigation to recognize the most minute changes that doubtless go on there both in functional and in organic diseases of the nervous system. As to what the changes are that occur in so-called functional nervous diseases we must admit an ignorance almost as great now as it was many years ago, although our conception of functional diseases has undergone a marked change and it is now conceded that even in functional diseases cellular changes are present, transitory though they be. Great as has been our progress in our knowledge of the physical changes in the nervous system, still more, perhaps, have we advanced in our conceptions of the psychological processes that go on in strictly mental cases. Our knowledge of normal and morbid psychology has received marked impetus through special work by the French school.

A scientific study of the phenomena heretofore dealt with only by those interested in the occult has opened a wide field of investigation, rich in material for the trained psychologist. In that fascinating domain of abnormal mental phenomena, embracing the various forms of amnesia, as well as in the manifestations of so-called subconscious states as revealed in epileptic, hysterical, and toxic psychoses, and also in the various forms of obsessions, we have been able to recognize a train of allied phenomena of high scientific interest and having a practical application, therapeutically. Correlated with investigations into the strictly physical elements are the studies of observers of mental phenomena and so-called borderland cases of perverted mental function. Our knowledge of the activities of the normal mind has been augmented by a study of these so-called borderland cases so often met with among the highly cultured and intelligent.

It is indeed significant that these manifestations of mild mental changes occur among the most highly developed nervous organizations. This is, however, not surprising; the development of psychic life having been gradual, through successive eons of evolution. The most complex, more highly organized in the scale, man, is yet the most unstable and most easily affected by hurtful stimuli. As in development, so in decay, the process of degeneration affects first the more highly developed, the more delicately organized structure and function; hence, those of the highest mental attainments are the most easily deranged. We see this process illustrated in certain forms of brain disease, deterioration beginning with the highest and most esthetic qualities, those last in the process of evolution.

The study of subconscious life in man is of vital importance; indeed the mechanism of consciousness itself is hidden within the depths of the subconscious, and to these depths we must descend to understand certain

phenomena of the human mind. It is no longer possible for the intelligent physician to be without some knowledge of the phenomenon of the so-called subconscious self. From early times down to the present the mysteries of the so-called supernatural phenomena have played an important rôle in the world's drama. A study of the occult is now being made by trained scientific medical men. We know now that the revelations of "crystal gazing," "shell hearing," and many of the subtle manifestations of the so-called "spirit medium" are the products of subconscious mental activity. The crystal gazing and shell hearing and like phenomena result from the subject gazing into a crystal or listening to the "roaring" of the shell. In these we have illustrations of subconscious ideas rising into the plane of consciousness; the subconscious or sleeping self, or fragments of this self, in the form of past experiences, forgotten incidents, rise to the foreground and are either visually or orally projected into the crystal or shell. In this way are supposed "messages" delivered from the "other world." The spirit medium is capable of autohypnosis; brings to the upper consciousness knowledge of incidents and experiences hidden within the depths of her own subconsciousness. The sleeping self, the state in which the medium is able to project herself by autohypnosis is a highly sensitive self, indeed, hypersensitive to a remarkable degree. I had occasion to observe the intensity of this hyperacuity of sense in a case of dual personality. The operations of the subliminal self explain the greater part of what has been looked upon as in the realms of the mysterious; some of the greatest minds, past and present, have been impressed by the strange manifestations observed in theosophy, spiritualism, occultism and allied cults. To the critical mind it is evident that behind the various devices of deception there remain many manifestations to substantiate the belief that there must be some rational explanation for these phenomena, and we need go no further than to study the operation of subconscious states.

There are many ways of proving the co-existence of one or more selves in many individuals, perhaps in all of us. Within the subliminal self we will find buried memories, lost experiences, knowledge totally differentiated from the waking self at times reacting upon the upper consciousness, affecting the temperament of the waking self, the active personality. The contents of this hidden self may rise and become a part of the waking self; it may emerge in a fragmentary way or, if in its entirety, it may give rise to an entirely new personality, the upper self falling in turn into the realms of the subliminal. These are the cases of true double or multiple personality.

In hypnosis the subliminal self rises to the surface of consciousness, becoming for the time being the dominating personality. Double personality is remarkably well demonstrated, particularly in so-called hysterical individuals by the phenomenon of "planchette writing." By means of the planchette it may be demonstrated that while the hand of the subject is

writing impressions the attention of the upper self is operative in another direction, totally oblivious to what the induced anesthetic hand is writing. The experiments may be made so complex as to demonstrate the possibility of two independent instruments of conscious activity co-existent.

Of course, the most absolutely demonstrative evidence of subconscious activity is to be found by a study of the cases of double or multiple personality. Stevenson's "Strange Case of Dr. Jekyll and Mr. Hyde," and Julian Hawthorne's interesting tale, "Archibald Malmaison," undoubtedly originated in genuine cases; the author, of course, giving dramatic color to the tale.

The case of the Rev. T. C. Hanna,* under the observation of the writer, is the most remarkable one in medical annals. It was studied by me conjointly with Prof. Boris Sidis of Harvard University.

Hanna, in his so-called second self was able to locate hidden objects and show other manifestations of sense hyperacuity totally impossible in his normal or primary state. The case referred to was in many ways a most remarkable one of total amnesia with double personality in which the loss of memory between the two selves was entirely bridged over. The case is unique in medical literature.

I was called to Plantsville, Conn., to see Hanna six weeks after an accident which occurred while he was driving. The young clergyman was thrown upon his head from his carriage and rendered unconscious. After several hours he regained consciousness, opened his eyes on what to him was a new world. He had lost every vestige of memory, involving all knowledge of himself, all forms of language, personal relationship, his identity; even the most primitive percepts and concepts were lost. He could not differentiate between the animate and the inanimate. He did not know how to eat; he could not interpret the sensation of hunger. The world to him was a chaos of varied and uninterpreted sensations. The simplest functions had to be explained to him. However, he learned with most astounding rapidity. His reading and writing were those of a child. First he learned to print, and was ambidextrous. In his normal, or what we have termed his "primary" state, he was a fine Latin, Hebrew, Greek and English scholar. In his "secondary" his memory for newly acquired material was most acute. He learned to play instruments with marvelous ease. In his normal or primary state he was not at all musical. Thus I found the young man slowly learning anew, as though in infancy, the only difference being the marvelous retentiveness of his memory, the acuteness of his observation, and the ease with which he absorbed new ideas. We watched first his primitive states; then watched him day and night; and finally found that during certain states, especially in the early morning it was possible to reach the subconscious which contained the past experiences, the life before the accident. By psychological methods, particu-

*This case was recorded in *Multiple Personality*, by Sidis and Goodhart. D. Appleton & Co., 1905.

larly by what we have termed "tapping" the subconscious, we were able to bring to the surface the dormant sleeping primary personality.

During the course of treatment we had him here in New York, and were finally successful in stimulating the primary personality. In this primary state he was the Mr. Hanna inclusive of everything from his birth to the day of the accident. In the secondary state he was the Mr. Hanna inclusive of the life experiences beginning right after the accident. The two personalities alternated; in the one state he knew nothing of the other. By applied methods of psychopathology we were able to bring the two personalities together. The man finally made a complete recovery, the two lives blending into one. The case is replete with interesting psychological phenomena and is most instructive to students of mind.

The whole subject of subconscious phenomena is one which should command the interest of every practising physician. Morbid ideas, obsessions, and many forms of distressing mental conditions, not strictly within the pale of the aberrant states, find their etiological nucleus buried within the depths of the subconscious. Much of the work of Freud, Janet and others is based upon the recognized influence of subconscious phenomena.

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SOME LATER VIEWS ON PELLAGRA.

By FRANK ESKRIDGE, M. D., of Atlanta, Ga.

A number of interesting articles have appeared recently in the various medical publications, treating of the subject, pellagra, written from different points of view, as is natural in dealing with a disease so suddenly discovered in a new section, and one presenting so many different phases.

In this paper, it is my purpose to present the clinical features of pellagra as they appear in this country, advance the various views on etiology, as well as to give a few remarks on treatment.

My personal experience with pellagra dates back to a case observed in the Presbyterian Hospital, Atlanta, Ga., in the early spring of 1908. This case was at first improperly diagnosed as sprue by my esteemed colleague, Dr. B. E. Pierce and myself, basing our diagnosis purely upon textbook knowledge of this tropical aphtha. Later, however, upon closer examination and post-mortem findings, we decided upon the diagnosis of pellagra. Since that time I have had occasion to observe some 60 odd cases, scattered over the country, varying in degrees of intensity. The disease is far more prevalent in this country than is generally accepted, and while only about 1,000 authentic cases have been reported in these United States, the fact that the endemic territories of Europe register in the neighborhood of 300,000 pellagrins is enough to cause our careful investigation, and to recognize the importance of pellagrous symptoms in the early stages of the disease.

Pellagra is not a new disease. It can be traced as far back as 1730 when an Asturian physician described the malady under the name of *Lepra Asturiens*, and considered it a mild form of leprosy. Twenty years later we find scattered cases in one of the Northern provinces of Italy, while a number of physicians in Northern Italy and Southern Spain gave accurate accounts of a similar malady under various names, between these two dates. And it is, indeed, likely that pellagrous symptoms were recognized as unusual manifestations of other diseases, most likely leprosy, as that disease was prevalent in the named territory at that period, many years before it was recognized as a distinct morbid entity. The name pellagra, a Greek derivation meaning "rough skin," was given the disease by an Italian physician.

Pellagra is a chronic disease with periodic exacerbations of acuteness, affecting usually the rural population of countries in which Indian corn or maize may or may not constitute an important article of diet. On this continent the disease was first described by Brouhard in the early forties

in Mexico, though some reference is made in literature of the sixteenth century that a similar disease was prevalent among the Indians of North America. Twenty years later cases were reported in New York by Gray, but it is only within recent years that its presence has been detected generally. In 1883, Sherwell reported another case in New York. In 1901, Harris, of Atlanta, Ga., reported a case strongly suspicious of the malady. Five years later Alabama reported the first positive epidemic in the insane hospital of that state. The Carolinas have been contributing the greatest number of cases so far reported.

The onset of pellagra is insidious, sometimes covering a period of several years. Preceding an exacerbation of the disease there is a stage of acute invasion presenting indefinite symptoms of gastro-intestinal and nervous disturbances. Patients complain of periods of depression, becoming melancholic and dissatisfied with the usual run of affairs. They develop an abnormal irritableness, and are affected with giddiness, dizzy headaches, lumbago, and distressing insomnia. Again, these symptoms very rapidly assume a more serious character, terminating with diminished or doubled vision, uncertain gait, extreme fear, marked emotional disturbances, accompanying either a ravenous appetite, or entire loss of appetite, insatiable thirst, sensations of esophageal burnings, acid eructations and periodic vomiting. At this stage patients assume the characteristic *facies pellagrosa*, which is strikingly impressive. The peculiar cachexia and tightly drawn skin, combined with the restless rolling eye, and anxious expression immediately arouse suspicion. These symptoms, given almost in regular order of appearance, by no means appear so distinctly in every case of pellagra.

The clinical picture is not altogether typical, but the trained eye begins to detect the peculiar characteristics of the disease long before the erythema confirms the diagnosis. After the appearance of the eruption almost immediately follows the diarrhea, perhaps the most aggravating symptom to be dealt with therapeutically. The eruption usually appears about three months after the beginning of the acute invasion. This is generally advanced by the actinic rays of the sun, and is commonly seen in the spring season of the year, and if left undisturbed will continue until late in the autumn. The eruption also bears characteristic features. It is symmetrical in appearance, attacks the exposed surfaces of the body, and varies in extent and severity from a small area of redness, with itching and puffiness of the skin of the backs of the hands without exposure of raw surfaces, to extensive areas of hard, thick exfoliated surfaces, sometimes cracking deeply to almost the bone, suppurating and terminating in gangrene. While the unprotected surfaces of the body exhibit commonly skin manifestations of greatest intensity, I have seen erythematous areas of the most pronounced type attacking the covered surfaces of the chest and feet. Sharply defined thickening and roughness over the finger joints is a very commonly observed condition. The epidermic

lesions of the forehead, forearms, dorsal and plantar surfaces of the feet sometimes present in advanced cases blisters, or blebs which contain a watery serum. These cases are spoken of as moist pellagra. In time these blebs burst, dry and desquamate. In cases with milder skin manifestations, I have witnessed the appearance of the dermatitis prominently for several days, which would clear without treatment, leaving only pigmented areas. In pellagrins with tendencies to obesity, the skin folds of the neck and chin form a common field of roughness and inflammation.

In children the cutaneous symptoms are much milder, of shorter duration, but of more frequent recurrence.

Of all the distressing conditions present in a case of pellagra, with the exception, perhaps, of the mental deviations, the alimentary mucous membrane involvements are the most likely to plunge the patient into deepest despondency, and the physician into utter hopelessness.

Among the disturbances of the digestive tract most frequently noted in the early stages, preceding the diarrhea, are the various forms of indigestion; some patients find that certain foods (not especially corn products) upset them. They may complain of gastric soreness and distention; sometimes nausea and vomiting are the source of much annoyance. The derangement, however, of chief importance is diarrhea. This condition may appear early or late in the disease; be temporary in duration, exist only for a few weeks, or persist throughout the entire acute stage, while looseness of the bowels is occasionally observed among patients who have suffered from pellagra for several seasons. The character and extent of the diarrhea vary within wide limits. There may be but a few movements, and these restricted to the morning hours, or there may be as many as thirty watery, frothy and foul-odored evacuations during the day. While the discharges are usually as above described, they are frequently seen to be of soupy consistency, containing blood and shreds of mucus. Patients exhibiting a virulent form of the malady present intestinal disturbances of greater severity, and are frequently disturbed at night by a desire to evacuate. Intestinal flatulence, colicky griping pain and rectitis sometimes greatly aggravate the excruciating suffering, and form most troublesome complications.

The development of stomatitis presents interesting characteristics. The tongue assumes a beefy appearance, with extremely sore tips and edges. The mucous membrane of the mouth, and the lips present marked inflammation and sensitiveness, with subsequent desquamation. Salivation increases and progresses sometimes to the production of great quantities of thick, frothy saliva, accompanied by an insatiable thirst.

In female cases, extensive vaginitis is a common symptom.

The mental and nervous disturbances of pellagrins are all important factors throughout the attack. From the invasion of the malady, expressed in the slight form of depression and mild mental confusion to

the development of real characteristic psychoses, the involvement varies. Sometimes the nervous and mental alterations are the most prominent symptoms from the onset, becoming immediately chronic, terminating fatally. In several cases I have witnessed the mildest forms of nervous symptoms with the presence of violent pellagrous symptoms otherwise. As a rule, however, the psychical and physical disturbances go hand in hand. Melancholia, extreme fear, confusion of thought and memory, depression and morbid impulses constitute the common symptoms. Maniacal excitement, delusional insanity, suicidal mania, and persecutory hallucinations are seen in the latter stages. Pellagrins have never the lucidity of the non-delusional melancholic, lacking his errors and the coherence of the melancholic delusions. They show, if exalted, more fear than rage, more confusion than gait (Tanzi). Marked loss of muscular coördination of upper extremities is often noted, while spastic and paralytic conditions involve the lower extremities.

Tetanic convulsions were present in one of my cases, while wandering mind and body drawn by spasms closed the scene for several others. There is often great fear of impending death, and in three of my patients marked fear of being operated upon was present. The mental symptoms usually abate with the primary attack of the disease to reappear with marked character of severity and permanency later.

The temperature ranges about normal, seldom going above 102 degrees Fahrenheit. The pulse rate averages 110.

Pellagra is not contagious, and hereditary transmission is extremely doubtful. The causative factor of the disease has not been positively determined. The maize theory holds greater force, perhaps on account of the priority of its advancement, and the lack of scientific refutation. Sambon, in his highly interesting report of his investigations of the subject, shows a number of cases in both children and adults who had never eaten corn products. Lombroso made extensive studies in the early sixties, and arrived at the conclusion that unripe, too early harvested corn was responsible for the disease. His opinion, he claimed, was based upon the findings of two extractive toxins in fermented maize, and he claimed to be able to produce pellagrous symptoms by human injection of these active principles. This theory, in its original and modified forms, has been adhered to by distinguished scientists and medical men for years. However, the view has not been accepted by other men equally as distinguished. Belmondo has long held to the view that the disease was due to a specific organism.

Other eminent authorities on tropical diseases, including Manson, doubt the etiological responsibility of corn. Louis W. Sambon, M. D., F. Z. S., of the London School of Tropical Medicine, has advanced an irrefutable theory that not only is maize not responsible for pellagra, but it has nothing in common to do with the disease. He contends parasitic origin, advancing that the seasonal recurrences can only be explained

by the alternating periods of activity and latency of a parasite. He has shown a constant and characteristic distribution. He has also demonstrated that in certain endemic territories it affects all ages and color. A most interesting feature of his investigations is the establishment of the fact that the pellagrous territories are to a great extent confined to the near vicinities of certain bodies of running water. A species of the stinging sand-fly, *Simulium reptans*, is held by this same investigator to be responsible for the transmission of pellagra. Upon the basis of this theory, Prof. Alessandrini, of Rome, has made investigations in connection with water and pellagra. He contends that in superficial wells and unprotected water he has found larvæ of nematoda, belonging to the family of filaria, producing the disease.

Long, of the United States Hospital and Marine Service, advances a theory that "pellagra is a disease resulting from an injury to the intestinal mucous membrane, produced by amebæ." Sodium chloride is thought by some to play an important rôle in the cause. In Italy, where salt is a government monopoly, the peasantry, among whom pellagra is indeed very prevalent, make their polenta and corn-pone without addition of salt, and it has been reported that this addition will not only prevent the disease, but will overcome it to a certain extent.

In the February Health Report of the United States Marine Hospital Service, Lavinder reviews at some length the experimental work of Raubitschek, as to the effects of exposure to sunlight upon maize-fed animals as a possible factor in the etiology of pellagrous dermatitis.

In most every country in which pellagra has made its appearance, there are movements on foot to solve the problem of the causation of pellagra, but up to the present day progress has been anything but encouraging.

In the treatment of pellagra, equally as little progress has been made as in the discovery of the etiological factor. No agent has been found that exerts a specific action upon the disease. In beginning cases the removal of predisposing conditions is a most important matter of treatment. In pronounced cases, as a rule, treatment is reduced to the mere relief of symptoms. Arsenic stands pre-eminent as the one agent to combat skin manifestations; in my hands it has proved its efficiency. Dyer regards quinine of great value, while iron and strychnine have held the fort as tonic prescriptions. In my practice I employ for the pellagrous diarrhea a prescription of argyrol in a proportion of five grains to a teaspoonful of an 8 per cent. bismuth suspension, given every four hours. Atropine hypodermically in 1/300 gr. doses gives good service in combating the increased salivation. Absolute rest in bed is essential. An ointment of ichthyol and lanolin for the dermatitis is usually all that is required for this condition. Among the arsenical preparations the most useful in my hands has been the salicylarsinate of mercury, given intramuscularly. The injection is painless, and the elimination, mainly by

urine, is very marked, greatly reducing the toxicity of the drug. In my mind this preparation exerts an elective effect on pellagra. Ehrlich's dioxydiamidoarsenobenzol has been employed in pellagra to some advantage.

Torrence, McLester and Nice, of Birmingham, notice a material change in the skin lesions, ptyalism, vaginitis, weight and mental symptoms. A solution of argyrol 10 per cent., I employ routinely for the stomatitis.

Conclusions.—After an exhaustive reading of many works pertaining to the subject, and from a close study of the cases under my care, I am forced to the conclusion that pellagra is not essentially a corn disease and that it may be found under conditions that absolutely eliminate corn from the possible causes. The essential factor is still unknown, while the new theories advanced as to the etiology of pellagra should be followed with keen attention; still none of them has been proved to be more than an interesting suggestion, while at the same time the old theories occupy this same position. The disease in this country is of an acute character, assuming a severe form, but if taken in hand early the prognosis is brighter than has been pictured.

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MEDICAL AND SURGICAL PROGRESS.

INFLUENZAL MENINGITIS.

A REVIEW OF RECENT LITERATURE.

By ALFRED FRIEDLANDER, M. D., of the Editorial Staff.

1. Ager: Influenzas of Childhood. (*Amer. Journ. of Obstetr. and of Diseases of Women and Children*, January, 1911.)
2. Clemens: Influenzal Meningitis. (*Archives of Pediatrics*, March, 1911.)
3. Davis: Influenzal Meningitis. (*Amer. Journ. of Diseases of Children*, April, 1911.)
4. Dunn: Cerebrospinal Meningitis. (*Amer. Journ. of Diseases of Children*, February, 1911.)
5. Holt: Acute Meningitis. (*Amer. Journ. of Diseases of Children*, January, 1911.)
6. Simon: Influenzal Meningitis. (*Monatschr. fuer Kinderheilk.*, Vol. IX., No. 10, 1911.)
7. Wollstein: Influenzal Meningitis and its Experimental Production. With full bibliography. (*Amer. Journ. of Diseases of Children*, January, 1911.)

In 1892 Pfuhl reported cases of purulent leptomeningitis due to B. influenzae, but in these cases the influenza bacillus was not obtained in pure culture. In 1898 Fraenkel reported 2 cases, in boys of ten weeks and nine months of age. In 1899 Slawyk reported the case of a boy, nine months of age, from whom during life the influenza bacillus was grown in pure culture from the cerebrospinal fluid, and from the blood of the finger; while at autopsy the bacillus was found in pure culture elsewhere in the body. This was the first case to place cases of general influenza-bacillus infection on a sound bacteriological basis. Since this time, cases of influenzal meningitis have been reported regularly in the literature. That the condition cannot be very common is proved by the fact that Wollstein, writing in January, 1911, is able to collect only 42 cases from the literature, adding 7 more of her own. Of these 49 cases, only one occurred in an adult, and only 4 of the remainder were over three years of age. Of these 49 cases, 44 died (89 per cent.). Of the 5 recoveries, one occurred in the adult, 2 in children of seven and nine years. Practically similar findings are represented by Simon. According to his figures the mortality of influenzal meningitis averages 90 per cent. In the first two years of life the mortality runs to 94 per cent., in the first year of life to 96.3 per cent.

Holt says that the disease "almost invariably" ends fatally. He calls attention to the interesting fact that Flexner reports that a considerable number of cerebrospinal fluids sent to him with the clinical diagnosis of meningitis, contained only the influenza organism.

Davis alludes to the difficulty of settling just how many cases should be included as primary influenzal meningitis, because mixed infections occur in a considerable number. According to Davis, however, it is undoubtedly true that in many, if not in all, of the cases of mixed infection, the influenza bacillus is the primary invader of the cranial cavity, for the reason that cocci, which are found associated with influenza bacilli, are very common secondary invaders, whereas influenza bacilli are rarely found as such.

The cases are widely distributed, occurring in various European countries and in America. (Davis reports 7 cases found in Chicago in one year. Wollstein, 8 in New York in a little over a year.) It is not probable that there is any great increase in the number of cases; it is only that with newer bacteriological methods, the recognition of this special type of meningitis has become easier.

Davis, from his study of the literature, finds that the cases may be said to be sporadic, there being no tendency for them to occur in epidemics; neither is there any clear association between their occurrence and epidemics of influenza. He, too, notes the fact that the disease is largely confined to infants under one year of age.

So far as the clinical picture is concerned, in the 7 cases reported in detail by Davis, the onset as a rule was indefinite and the exact time when the meningitis developed could not always be determined. Eye-symptoms were usually present, and in all cases, rigidity of the back and legs, and retraction of the head were marked. Definite convulsions occurred in 5 cases; other early symptoms were cough, with or without definite pneumonia, bowel disturbance and restlessness. Bulging of the fontanel was evident in all cases. The temperature generally was variable, ranging from normal to 105° F., or higher and subject to sudden change. In one case there was a petechial eruption before death. The pulse was irregular, usually rapid.

Lumbar puncture (made in 4 cases) showed a highly turbid fluid, always under high pressure. In the fluid there were many leucocytes, chiefly polymorphonuclears (60-80 per cent. of all the cells). Red-blood cells were not found and the fibrin was scant.

In a case recently reported by Clemens, practically the same picture was present. Clemens notes the fact (also referred to by some other authors) that the cerebrospinal fluid is especially thick, as he says "creamy massive fluid that flowed with difficulty through the cannula."

Ager, referring to the fact that in influenzal meningitis the cerebrospinal fluid is apt to be very thick, says that it is also quite possible that in some cases of meningitis in which there is a report of a "dry tap" we have an influenzal infection, and this for the reason that in the last stages, the cerebrospinal fluid becomes so thick that it fails to pass through an ordinary needle.

Analyzing a series of 142 cases of all forms of meningitis, Dunn found 4 of the 142 cases to be of the influenzal type. This type has no special characteristics of its own, the onset, symptoms and course being variable.

So far as the pathology of the disease is concerned, Davis has reported the autopsy findings in 5 of his 7 cases. In 4 an abundant, highly purulent leptomeningeal exudate was found, most marked at the base and about the frontal lobes. In these regions, marked compression of the

convolutions occurred. Over the cortex, the exudate was often patchy, usually more abundant along the blood-vessels. In one case there was an extensive hemorrhagic exudate, delicately attached to the dura. This exudate has hitherto not been reported in influenza infection, though it is common in the meningococcus forms. In no case was there hemorrhage into the brain substance. Acute hydrocephalus was found in one case.

Histologically, the exudate was very rich in cells, chiefly polynuclears. Influenza bacilli were found in the exudate always. The exudate followed the pia into the deepest sulci, but the infiltration of the cortex was never extensive. Generally, acute degeneration of the various viscera was evident. The influenza bacillus was isolated in pure culture from the meningeal exudate and cerebrospinal fluid, in all cases. The bacilli were usually present in enormous numbers. (A finding also reported by other observers. Ed.)

Morphologically and biologically the influenza bacillus isolated from these cases was in no way different from the bacillus as found in the sputum under other conditions. The bacilli in isolated post-mortems were all tested in rabbits and guinea-pigs without showing any special degree of increased virulence as compared with influenza bacillus isolated from sputum.

Wollstein's detailed report of 8 cases showed, in each instance, that the cerebrospinal fluid was cloudy and full of sediment. In the cases in which the progress of the disease could be followed, it was seen that the spinal fluid became successively more and more purulent.

The number of influenza bacilli found in the fluid was very large, and there was very slight phagocytosis.

Detailed reports as to the morphology and cultivation of the bacilli, as isolated from these cases, are given, for which the original article may be consulted.

It is of special interest to note that Wollstein made a large series of inoculations of these bacilli into animals, using mice, guinea-pigs, rabbits, and monkeys. The most important experiments, from the chemical standpoint, were those on monkeys. Wollstein succeeded in producing infection of the meninges in two species of monkeys, by injecting suspensions of influenza bacilli into the subdural space by means of lumbar puncture. The experimental disease closely simulated the clinical disease as it occurs spontaneously in human beings and like the latter, was rapidly fatal.

With reference to the mode of infection in influenzal meningitis, there is this to be said: It is a well-known fact that influenza bacilli occur in the nasopharynx of a high percentage of persons exposed to influenza. The upper respiratory tract would appear to be the most frequent portal of entrance into the body for these organisms, and to account for their frequent localization in the middle ear, bronchi and lungs. Whether the meninges are infected directly through the lymphatic connections, existing between them and the upper nasal mucosa, must for the present remain an open question. It is of course to be remembered that in the majority of cases of fatal influenzal meningitis a general blood infection probably occurs.

Davis is of the opinion from his autopsy studies that nasal infection is most probable in the majority of cases.

No method of treatment for these cases has as yet been suggested, except that repeated lumbar punctures have been advised, especially by Dunn.

PELLAGRA.

A REVIEW OF RECENT LITERATURE.

By MARTIN F. ENGMAN, M. D., of the Editorial Staff.

1. Cole: Transfusion in Pellagra. (*Journ. Amer. Med. Assoc.*, February 25th, 1911.)
2. Gurd: Histological Study of Skin Lesions in Pellagra. (*Journ. Exper. Med.*, January, 1911.)
3. Hirschfelder: Cutaneous Tests with Corn Extracts in Pellagra. (*Arch. for Inter. Med.*, November, 1911.)
4. Lavinder: Pellagra, a Précis. (Government Printing Office, 1908.)
5. Babcock and Cutting: Prevalence of Pellagra. (Government Printing Office, 1911.)
6. Zeller: Pellagra: Some Clinical and other Features of the Disease. (*Interstate Medical Journal*, October, 1910.)
7. Babcock: Amebas as the Cause of Pellagra. (*Journ. South Carolina Med. Assoc.*, November, 1910.)
8. Buhlig: Bacteriology of the Stomatitis of Pellagra. (*Quarterly Bull. North Western University Medical School*, December, 1910.)
9. Tucker: Pellagra, with the Analytical Study of Fifty-nine Non-Institutional or Sporadic Cases. (*Journ. Amer. Med. Assoc.*, January 28th, 1911.)
10. Tizzoni: "Causa Causans" of Pellagra. (*Lancet*, January 28th, 1911.)
11. Alessandrini: "Causa Causans" of Pellagra. (*Lancet*, January 28th, 1911.)
12. Marie: Pellagra. (Columbia, S. C.: State Co. Publishers, 1910.)

Prevalence of Pellagra.—One thousand cases of pellagra have been reported from thirteen States, more than half of these being in almshouses or asylums. The cases reported have been largely from the South or Gulf States, but nests of cases have been discovered in New York, Pennsylvania, Massachusetts, New Jersey, Maryland, Oklahoma, Arkansas, Kentucky, Iowa, Kansas, California, Ohio, New Mexico, Colorado and Missouri. In Illinois it is particularly prevalent. Zeller states that the causative agent is present in Illinois in widely distributed sections of the State, and just as long as the causative factor is present and *that factor remains unknown*, just so long is public health endangered. Babcock believes that pellagra has probably existed in this country since the Civil War, as Gray and Tyler reported authentic cases as far back as 1864; the mortality of the terrible Andersonville, Ga., prison can be attributed to this scourge. Blue, quoted by Babcock, makes the statement that pellagra can be found to-day in nearly all the insane asylums and almshouses in this country. This statement, as Babcock says, is far too

sweeping. The writer of this review can assert positively that there was no pellagra present in any of the asylums or almshouses about St. Louis last June, as he personally searched all of them carefully. There were some bad sunburns and cases of eczema, but no pellagra. Pellagra, as such, is a new disease to us, that is since the excellent and fearless work of men like Babcock, Zeller, Lavinder, Young and others has forced the fact upon us that pellagra is in our midst and that it has probably been with us and unrecognized for from fifty to one hundred years. It is now established that pellagra exists in almost every State and Territory in the Union, not only in institutions but sporadically, as isolated non-institutional cases are frequent. In the State of Missouri, the writer has seen several. Tucker reports an analysis of 50 sporadic cases. The epidemicity of these cases proved that in ten instances there were other cases in the immediate neighborhood; in one instance the second patient was a sister of the first. The cases as a rule were widely separated, geographically. In the State of Virginia, in 45 consecutive cases, pellagra occurred in one county only in 19 cases, 2 cases in eight instances, 3 in two instances, and 4 in one instance. Therefore, Tucker concludes that the disease is widely spread, that it did not occur in local epidemics, that it was more common in rural districts than in cities, and that while it affected chiefly the lower classes, it was occasionally seen among those of good hygienic and local surroundings. At the request of Senator Tillman, of South Carolina, Mr. W. Bayard Cutting, Jr., Vice-Consul at Milan, made a complete report of the pellagra question, which he submitted through the proper channels to the Assistant Secretary of State. It is a masterly piece of work and industry, to which we will refer later. In speaking of the prevalence of the disease in Italy, he remarks that the total number of cases would be no true index of the progress. In 1907, there was approximately one new case for every 4,072 of the population, or 24 per 100,000 inhabitants. Rural kitchens and dessicated plants, he believes, have been potent preventive measures in checking the spread of the disease.

All writers agree that pellagra is no doubt widely distributed in this country, but not to such an alarming extent as to consider an epidemic imminent. A careful survey of the journal literature will convince one of this fact. Sporadic cases spring up now and then in unexpected districts and are now pretty generally recognized, whereas a few years ago these cases would have been classified as eczema, sunburn, or dysentery. For the last two years the symptoms of pellagra are known to the profession at large; hence, to-day we have a fair insight into its prevalence.

Etiology.—The war between the Zeists, or those who believe pellagra has some direct relationship to corn, and the Anti-Zeists, who oppose this theory, still goes on. Nothing definite or convincing has been demonstrated to throw light on the cause of the disease.

Marie's little book, especially the English translation, so ably executed and brought up to date by Babcock and Lavinder, gives the most able review of the present situation. The idea of a causal relationship between corn and pellagra is almost as old as the history of the disease itself. The corn theory is placed by these writers into the following groups:—

1. The idea that corn as a food-stuff is wanting in proper nutritive value. But corn is of high nutritive value and furthermore pellagra is found among those having a well-mixed diet.
2. The idea that good sound maize contains certain toxic substances

which cause pellagra. The idea is discredited by the absence of pellagra in many places where corn has been used for long periods as food.

3. The toxico-chemical idea that corn by reason of parasitic growths (bacteria or moulds), may undergo change with the formation of one or more toxic substances of a chemical nature (exogenous poisons).

In other words in this case we might have the formation of a poison in the grain outside the human body by these parasites which when introduced into the body may cause the disease, pellagra. The parasites may be harmless to the body, but their toxine produced in or on corn is poisonous. This is the Lombrosian idea, and has attracted the majority of adherents. Babes and Manicatide think they have demonstrated in the blood of cured pellagra patients a specific antitoxic power against the poisons of spoiled corn.

4. The toxic-infective idea that from spoiled corn there is formed within the body certain toxic substances (endogenous toxines). With this view the disease becomes a form of auto-intoxication. Marie seems to favor this view. Others believe that spoiled corn may be a medium by which the colon bacilli elaborate a specific poison.

5. The idea that pellagra is the result of a specific infection, either by moulds or bacteria, derived from corn. The flora of corn has been investigated by many. Ceni declares pellagra to be due to an infection by two moulds, the *Aspergillus fumigatus* and the *Aspergillus flavescens*. His work has not been confirmed. Ceni claims that this fungus is taken in with cereals and that its spores withstand a high temperature in cooking of food. Tizzoni declares pellagra to be due to a specific bacillus which he calls the *Strepto-bacillus pellagræ*. He finds it in the blood and stools of both acute and chronic pellagrins. The organism is supposed to be derived from spoiled corn. Marie suggests that this micro-organism may be a secondary infection. Babcock and Lavinder have been unable to isolate this organism after repeated trials.

The Anti-Zeists are greatly in the minority. Two significant facts are offered against the corn theory:—

1. That corn is used where pellagra does not exist.
2. That pellagra exists where corn is not used.

In 1905 Sambon suggested that pellagra might be due to some protozoa. This theory has met with a great deal of attention, as some of the clinical and histological symptoms of pellagra suggest such a cause. The favorable effect of arsenic, atoxyl and lately salvarsan, as cited by many, upon the disease is suggestive of a possible protozoic origin. From its having a rather similar geographical distribution to malaria and other protozoic diseases it was thought probable that some insect acted as an intermediate host. Sambon in his later investigations has come to the following conclusions:—

Pellagra is not due to maize, either good or bad, because—

1. It is found in places where maize is neither cultivated nor eaten.
2. It is absent from many places where maize is the staple food of the population.
3. It has in many places either decreased or become more prevalent without any change in the food of the people.
4. Its constant and peculiar distribution does not agree with the very irregular and ever-changing distribution of spoiled maize.
5. In over a century and a half, since the maize theory was first suggested, no one has been able to prove it.

The belief that the disease has everywhere followed the introduction of corn cultivation is unfounded. Pellagra was first recognized as a specific disease in the beginning of the eighteenth century, but this does not prove that it was not prevalent long before that time.

Pellagra is a parasitic disease because:—

1. For years the person affected may present some seasonal recurrences, which can only be explained by a parasitic agent with alternating periods of activity and latency.
2. It shows a constant and characteristic topographic distribution.
3. It shows a definite seasonal incidence.
4. Its symptoms, course, duration, morbid anatomy, as well as its therapy, are similar to those of parasitic diseases.
5. Of two places, almost contiguous, one may be affected, the other not.

Pellagra is an insect-borne disease because:—

1. It is limited, like malaria, sleeping sickness, etc., to rural places and more especially to the vicinity of certain bodies of water.
2. It has a definite seasonal incidence—spring and autumn.
3. It affects, to a large extent, a certain class of people—the field laborers.
4. It is not contagious and neither food nor water can account for its peculiar epidemiology.
5. Within its endemic centers it affects all ages and frequently whole families.

6. Outside its endemic centers only adults who have visited the infection areas present the disease and frequently only one or two members in a family are affected.

Pellagra is conveyed by *Simulium reptans* because:—

1. *Simulium* is found in the torrents and swift-running streams of all pellagra districts.
2. *Simulium* has the peculiar seasonal distribution of pellagra (spring and autumn).
3. *Simulium* is found only in rural districts. It is unknown in towns and villages. It does not enter houses.
4. *Simulium* explains most admirably the peculiar limitation of the disease to field laborers.
5. *Simulium* is the only blood-sucking insect which the British field commission has found in its visits to numerous pellagrous districts in Italy.
6. *Simulium reptans*, like *Anopheles maculipennis*, has a world-wide distribution and explains the wide distribution of pellagra. It is found wherever pellagra is found.
7. *Simulium* causes epizootics in animals in America and in Europe.
8. Professor Mesnil has found a protozoal organism in *simulium*.

Alessandrini, of Italy, lately announced that he is convinced that the cause of pellagra was to be found in a parasite infecting the potable water drunk in the fields.

Thus we see that the scientific mind has not been inactive, as far as theories go, to explain the cause of pellagra. So it has been with all diseases whose cause is now known. Some day, someone will clarify the theory-laden clouds and a better understanding of the true cause will be attained. At present, however, one can take his choice and chance it—pick out the right theory or the proper organism, but it would be wiser to wait.

Prophylaxis.—Mr. Cutting believes that the rural kitchens established in Italy, where the food for the poor is of proper quality and prepared in a hygienic manner, have had a salutary effect. The dessicated foods also that were introduced in that country are a step in the right direction.

The Italian government has enforced certain laws for the prevention of pellagra, most of which apply to the exclusion of improper or spoiled grain and the proper care of grain. The poor are provided, as above stated, with a liberal-mixed or curative diet, the ingredients of which are prepared under the supervision of inspectors. There seems to be no doubt that proper food and proper hygienic surroundings are very necessary steps in fighting the progress of the disease. It is evident in every section that the disease is far more prevalent and in some instances almost limited to the poorer classes; this is especially so in Italy and Spain where pellagra is so widely distributed. In this country, in rural districts, there

do not exist the insanitary conditions so prevalent in the Latin countries, and, furthermore, our farming classes can usually obtain a generous-mixed properly-prepared diet. We have not the poverty and probably therefore not the pellagra.

Pellagra is certainly not a communicable disease.

Prognosis and Treatment.—Lavinder and Babcock state that pellagra is more severe and hopeless with us than with the Italians. The earlier the case is recognized the better the prognosis. The mental cases are most hopeless, as they generally go on to dementia. The chronic, non-mental type is the most hopeful. The disease may last for twenty-five years in extreme cases, but it usually runs a much more rapid course. Pellagra should be treated in an expectant way, much as is syphilis.

Diet, hydrotherapy, pleasant surroundings, arsenic in various forms, have all had their advocates. There is no doubt that much can be accomplished by treatment on a purely rational common-sense plan; that is all; no specifics have been found. Atoxyl, salvarsan, hexamethylenamine have been reported as showing "striking results" by their various advocates; but that is all. The tone of all such reports lacks enthusiasm and is not convincing. Transfusion from recovered pellagrins into those suffering from the active types of the disease has been reported by Cole with apparently fair (?) results.

Pellagra yet awaits a Schaudinn and an Ehrlich.

ANIMAL EXPERIMENTATION WITH "606."

By CARL FISCH, M. D., of the Editorial Staff.

1. Ehrlich and Hata: The Experimental Chemotherapy of the Spirillooses. (*Berlin. Julius Springer*, 1910.)
2. Gaucher (*Bulletin de L'Académie de Médecine*, Tome 64, No. 36).
3. Lesser: Organotropy-Spirillotropy. (*Berliner Klin. Wochenschr.*, No. 43, 1910.)
4. Michaelis: Treatment with Ehrlich-Hata in Internal Medicine. (*Deutsche Med. Wochenschr.*, No. 49, 1910.)
5. Schindler: As to a 40 per cent. Dioxydiamidoarsenobenzol. (*Berliner Klin. Wochenschr.*, No. 52, 1910.)
6. Touton: The Practical and Theoretical in Regard to Arsenobenzol. (*Berliner Klin. Wochenschr.*, Nos. 49 and 51, 1910.)
7. Uhlenhuth and Mulzer: Culture of Spirochæta Pallida in the Testicle of Rabbits. (*Muench. Med. Wochenschr.*, No. 32, 1910.)

The discussions in the medical journals throughout the world in regard to Ehrlich's discovery of the substance with which he hoped to eliminate the infection caused by the spirochæta pallida—a discovery which resulted from the action of a chemical product that had engaged his attention for a number of years—are so extensive and manifold to-day that it would be impossible to review them in their totality. This discovery is "606" or dioxydiamidoarsenobenzol, and it is based on his revolutionizing work in the matter of the specific action of substances on specific bodies that are chemically determinable as to their constitution, but which is not applicable to immunity bodies. In all of Ehrlich's labors his investigations rest on his side-chain theory which is not biological, but physical and chemical. Thus he was led to investigate the effect of immunization by chemically determinable substances. His endeavor was not a direct attempt to find a substance that would act on the spirochæta pallida, but one that would act on the infections caused by other spirochætæ—named formerly spirilla. There is no doubt that the pallida is a typical spirochæta, and the naming it, treponema, or classing it with other micro-organisms, is taking a wrong view of the matter.

The action of Ehrlich's substance was studied first in other infections caused by a number of other spirochætæ, trypanosomes and plasmodia malarix. Splendid results were obtained by complete sterilization of the infected subject. These facts led to experiments on rabbits, because for the most part they are susceptible to inoculation with spirochæta pallida. The infection usually subsided voluntarily after a month or so, the period of incubation being usually from three to four weeks. The experiments had for their first object the quantity of "606" which was necessary to accomplish the sterilization of normal animals and the extent of the sterilization that should not prove fatal. The dose was found to be from 0.02 grm. to 0.04 grm., while 0.02 to 0.03 was tolerated

without harm. The injections were made intramuscularly or intravenously, and the results were the disappearance, in a very short time, of the specific keratitis, and the healing of the ulcerated lesions of the testicle.

By carefully testing the effect of gradually increasing doses in syphilis in man and monkeys, a limit was reached by which the full effect of the chemical was achieved without any ill effects to the organism. Ehrlich pronounced the result obtained a complete sterilization of the organism, that is, the death of all spirochætæ.

For the sterilization of the spirochætæ, trypanosomes and plasmodia, Ehrlich's method was effective, but the spirochætæ pallidæ were not destroyed. The first-mentioned parasites live only in the vascular structures and not in the tissue; while in human syphilis it is only in certain stages that the spirochætæ are present in the blood in large numbers; generally they are not found at all. The spirochætæ, to be more explicit, are carried by the vascular structures into the tissues of the body; they multiply in these locations, thus causing both small and large lesions. The resorption of "606" naturally takes place in these lesions, and hence kills the virus which is found in them.

Ehrlich himself was desirous of having his findings confirmed by authoritative investigators of the problems of syphilis before making the matter public. The "sterilisatio magna," which in other words meant the elimination, by means of one injection of "606," of the total quantity of the virus in the body, was the goal which he wished to attain. Too short a time has elapsed, however, since Ehrlich's discovery to conclude with any definiteness that this goal has been realized, since the literature on the subject is a combination of favorable and unfavorable reports; most of it being worthless on account of the inadequate description of the manner of the injection. It appears, nevertheless, that despite the fact of the shortness of time since the first experiments were made, a total sterilization is achieved only in definite stages of the infection. It is a matter of record that in many cases a relapse has occurred after the injection, though in these cases all the difficult details as to the preparation of "606" and the technique as to the manner of its injection were closely followed. At present these matters are not definitely settled, as there is no unanimity of opinion as to whether alkaline, neutral, and acid solutions, or emulsions, should be used. This being so it strikes the writer that it is a mistake that "606" is to-day accessible to every practitioner; for mistakes will arise and great harm will be done to patients on account of this lack of definite knowledge. But the question is not only one of how to prepare "606" and what method of injection to employ, but one which involves a matter of the greatest import—namely, the importance of a physical examination of the patient prior to the injection. On account of this neglect, serious consequences have already occurred.

The primary lesions are the best indications for the use of "606." They are the ones, which if thus treated, may realize the hope of a total sterilization. If possible, these lesions should be excised as was done before "606" was discovered, or, if that is not done, an injection of a strong bichloride solution under the lesion should be made in addition to the administration of "606." Many cases have been reported which have been free from secondaries after five or six months. The first secondaries are the next best indication for the use of "606," although the results are less certain than in the primary lesions.

Of course, it should not be forgotten that in cases which do not

react to mercury or which have an idiosyncrasy against it, "606" is an excellent substitute. The recurrences after the administration of "606" are frequent. The reason for this can be attributed to the fact that certain of the tissue structures which harbor the spirochætæ, when situated in a mass of dense fibrous connective-tissue, are poorly supplied with blood and lymph. These tissues cannot be reached by the injection, and similar to tuberculous, fibrous, or even calcareous, lymphatic glands, they may become active again and cause relapses under favorable conditions. This factor limits the capacity of "606" as an absolute destroyer of the virus. The fact, that in early tabes and in other tertian lesions "606" has almost always a beneficial effect, is most likely due to the great scarcity of spirochætæ in these conditions. Taken all in all, although total sterilization cannot be achieved in the majority of cases, this should not detract from the value and importance of Ehrlich's discovery.

This conclusion was reached even by Gaucher of the French Academy of Medicine, although the record of his cases shows that there were many recurrences. Theoretically, the question resolves itself into this, Should we accept Ehrlich's assertion that arsenobenzol acts by killing the virus? Lesser does not agree with Ehrlich in this matter, but insists that the virtues of the treatment are the result of the action of arsenic in increasing the functional activity of the tissues, thus allowing them to cope with greater strength against the invasion of the spirochætæ. And he adds, that perhaps the destruction of the spirochætæ is brought about by the generation of antibodies.

Uhlenhuth and Mulzer have made the testicle of the rabbit a culture medium for the spirochætæ. A small piece of syphilitic tissue containing many spirochætæ is introduced into this organ by means of a trocar with a wire in it, to the end of which the syphilitic tissue is attached. In three or four weeks the testicle began to swell to an enormous size and contained masses of a pure culture of the spirochætæ. By using the needle of a syringe which is thrust into the organ it is easy to get a little fluid that contains almost nothing but spirochætæ. In the dark background illumination they are found so close together that it is almost impossible to see them individually. The culture can be continued through many generations by transferring it from one rabbit to another.

This pure culture of spirochætæ offers an excellent means of arriving at the conclusion as to whether "606" acts by killing the spirochætæ or by stimulating the tissue. One rabbit was subjected by me to an injection of 0.02 grm. into the vein of the ear four weeks after inoculation. Shortly before the injection was made, the testicle was punctured and immense numbers of the spirochætæ were found. Blood taken from a vein of the ear gave a positive Wassermann reaction. Twelve hours after the injection the testicle was again punctured, but not a single spirochætæ could be found. Only a few granular fragments, similar to what we see in chancres which have been cauterized shortly before examination, were demonstrable. The testicle then returned to normal size. The injection was made on October 9th, 1910, and on January 6th, 1911, the Wassermann reaction was negative and the rabbit was in perfect health. This case has been fully described because it corroborates Ehrlich's statement that "606" can effect "therapia sterilisans magna."

THE TREATMENT OF CONGENITAL CLUB-FOOT.

A REVIEW OF RECENT LITERATURE.

By NATHANIEL ALLISON, M. D., of the Editorial Staff.

1. Hagland: A New Club-Foot Operation. (*Zeitschr. fuer orth. Chir.*, Bd. XXIV., h. 3-4, 1909.)
2. Handeck: Treatment of Club-Foot in Infants. (*Zeitschr. fuer orth. Chir.*, Bd. XXV., 1910.)
3. Barnett: Treatment of Talipes Equinovarus by Plaster-of-Paris. (*Amer. Journ. of Surgery*, June, 1909.)
4. Bloom: Resistant or Neglected Club-Foot in Adolescence. (*New Orleans Med. and Surg. Journ.*, March, 1910.)
5. Crysospattes: Deformity of the Ankle from Congenital Malposition of the Fibula. (*Zentralb. fuer Chir.*, March 19th, 1910.)
6. Frieberg: Treatment of Club-Foot in Infancy. (*Ohio State Med. Journ.*, April, 1910.)
7. Ghillini: Orthopedic Surgery of Club-Foot. (*Zeitschr. fuer orth. Chir.*, Bd. XXVI., h. 4, 1910.)
8. Guaccero: Tenotomy in the Treatment of Club-Foot. (*Archiv. di Ortopedia*, n. 5-6, 1908.)
9. Kirchner: Etiology and Pathological Anatomy of Typical Congenital Club-Foot. (*Zeitschr. fuer orth. Chir.*, Bd. XXI., 1908.)

Hagland has found that in extreme cases of uncorrected equinovarus, the child being ten or twelve years of age, it is well to fill the gap on the inner side of the foot, caused by the correction, with transplanted skin and subcutaneous tissue from the excess of tissue on the other side. Handeck reports several good results from the use of the Fincke-Oettinger method of correction of club-foot in infants. Barnett says that the failure to correct a club-foot is due to ignorance of the conditions present, or failure to employ the requisite technique, or a combination of both. It is essential to understand the mechanism of the deformity, the altered anatomical relationship, and most of all the treatment. Good results depend upon (1) a knowledge of the anatomical structures and mechanical principles of the deformity; (2) the technique of operative methods; (3) the prevention of recurrence; and (4) the restoration of function. He gives a careful plan of operative technique and advises the continuance of active treatment till all evidence of the deformity has disappeared. The plasters should include the knees, and an attempt should be made to keep the tarsus in a position of normal arch.

Bloom's case of resistant club-foot was that of a fourteen-year-old boy, with extreme deformity. He was able to secure for this youth a pair of useful feet after twenty months of treatment, which included manipulation, osteotomies, and forcible corrections. Crysospatte's case, though it is not one of congenital club-foot, is one in which the foot was held in

a position of equinus by congenital deformity in the fibula. This deformity is due to the lower end of the fibula being placed posterior to the tibia. This condition was overcome by an osteotomy and correction done on the lower one and one-half inches of the fibula. The result was good.

In an excellent article, Frieberg draws the following conclusions:—

1. The most potent factor at our command for the cure of club-foot is the influence of weight-bearing upon the foot held in an overcorrected position.

2. Since this factor is not available until the tenth or twelfth month, it is not necessary to maintain over-correction by means of plaster-of-Paris until a period shortly before this.

3. Tenotomy for the correction of equinus should on no account be made until the other elements of the deformity have been disposed of.

4. On account of the greater size of the foot, both the over-correction and the retention dressings are more satisfactorily made between the tenth and thirteenth month than is the case within the first few months of life.

5. The period elapsing until the time for forcible correction has arrived is not to be spent inactively, but is to be utilized for increasing the flexibility of the foot by manipulations, accomplishing a partial correction of the varus by means of a splint.

6. The daily removal of the splint gives opportunity both for massage of the limb and active muscular effort on the part of the child. It is believed that by this means the residual atrophy of the leg muscles is held to a minimum.

7. It is believed that the whole period of treatment under this plan is not longer than the other plan; that one anesthesia will as a rule suffice, whereas under the older plan several such administrations were frequently required.

8. Because of the greater age of the child, correction as above suggested is much less objectionable to the parents, and the plan of treatment usually commends itself to them, as it has to the author on account of being thoroughly rational.

In all of the foregoing, it has been assumed to be the position of the modern orthopedic surgeon that bloody operations other than tenotomies have no place in the treatment of club-foot at this age, and likewise that the more complicated forms of orthopedic apparatus, formerly employed as a means of final correction, are to be replaced with advantage by forcible redressive manipulation. It has not been considered advisable to discuss these aspects of the question at this time.

Ghillini calls attention to these interesting points. He has never had a relapse from the Phelps operation, and believes that all obstacles to complete correction should be removed; bones need seldom be removed, and when they are, only as much as is necessary should be cut out. The foot must be held in plaster for seven months in most cases.

Guaccero believes that the results of the Phelps operation are often poor, when this operation is done on young children, because the tendons and muscles of the foot are caught in the extensive scar which is part of the operation, and lose their function. Even though the morphological results, so far as a straight foot is concerned, are excellent, the result from the standpoint of function is poor because the anterior portion of the foot has lost its mobility. He has reached this conclusion after a study of the results of the Phelps operation in after-life. He has found

no real degeneration of tendons, but instead fatty-fibrous degeneration which gives a tendon too weak for the work required. He believes a tendon elongation, carefully done, has a great advantage over the tendon cutting, as the tendon's fibres are thus conserved, and the resulting tendon will be able to do its work.

Kirchner points out that a position of supination is normal in intra-uterine life, and that the feet of the new-born are physiologically held in supination. This is due to the development of the astragalus. The club-foot is not really a vicious position of supination, but a position of plantar flexion and adduction which is associated with late appearance of the amniotic fluid. In this respect it is similar to congenital dislocation of the hip. The rarity with which the upper extremities is affected he explains by the statement that the lower extremities are developed less perfectly than the upper, and also that unilateral cases are due to the fact that the two sides of the body are developed differently. He believes it to be a developmental error dating back to the second month of fetal life, and not a condition caused by intra-uterine injury or position.

GASTRIC MOTILITY: SOME PHYSIO-PATHOLOGICAL CONSIDERATIONS STUDIED BY THE X-RAY.

A REVIEW OF RECENT LITERATURE.

By E. H. SKINNER, M. D., of the Editorial Staff.

1. Barclay: Gastric Radioscopy. (*Archives of Roentgen Ray*, Vol. XV., No. 5, p. 167, October, 1910.)
2. Barclay: Value of X-Rays in Diseases of Digestive System. (*Archives of Roentgen Ray*, Vol. XIII., p. 310.)
3. Cannon: The Movements of the Stomach Studied by Means of the Roentgen Ray. (*Amer. Journ. Phys.*, Vol. I., p. 387, 1898.)
4. Cannon: The Passage of Different Food-Stuffs from the Stomach and through the Small Intestine. (*Amer. Journ. Phys.*, Vol. XII., p. 259, 1904-5.)
5. Gross: Further Communications on My Duodenal Tube. (*N. Y. Med. Journ.*, Vol. 93, p. 76, July 9th, 1910.)
6. Haudek: Vienna Medical Society, Meeting February 9th, 1911. (Reported in the *Muench. Med. Wochenschr.*, No. 9, p. 491, 1911.)
7. Howell: Textbook of Physiology.
8. Jonas: Upon the Developmental State of Pyloric Stenosis and its Clinical-Radiological Diagnosis. The Significance of Antiperistalsis. (*Wiener Klin. Wochenschr.*, Jahrgang XXII., No. 44.)
9. Kaestle: Rieder, Prof. Dr. H. and Rosenthal, Dipl. Ing. Dr. Phil. Kinematographic Roentgenograms. (*Muench. Med. Wochenschr.*, Jahrgang 56, No. 6, 1909.)
10. Kaufman and Holzknecht: Peristalsis of the Antrum Pylori in Man. (*Mitteilungen a. d. Lab. f. v. d. Diag. in Wien.*, Band I., Heft 8, p. 67, 1906.)
11. Leonard. (*Amer. Journ. of Med. Sciences*, March, 1909.)
12. Mitchell: Atonic Dilatation of the Stomach. (*Lancet*, January 28th, 1911.)
13. Pancoast: The Radiographic Examination of Gastro-Intestinal Tract, etc. (*Trans. Amer. Roentgen Ray Soc.*, p. 45, 1908.)
14. Pfahler: Physiologic and Clinical Observations on the Alimentary Tract by Means of the Roentgen Rays. (*Journ. Amer. Med. Assoc.*, Vol. LIX., pp. 2069-2074, December 21st, 1907.)
15. Schwarz: Vienna Medical Society, Meeting February 9th, 1911. (Reported in the *Muench. Med. Wochenschr.*, No. 9, p. 491, 1911.)

Up to the time of Cannon's studies, the physiology of the stomach motility had been deduced from inspection of the stomach in animals and man after a laparotomy, or following a permanent gastro-abdominal fistula, or watching the gastric movements upon the abdominal wall, or by

means of gas bags inserted into stomach and then inflated. Cannon used the subnitrate of bismuth in food, which permitted the movements of the stomach to be viewed by the roentgen ray, fluoroscopically.

A modern physiologist, Landois, describes the motor mechanism of the stomach as consisting of middle circular, external longitudinal and internal oblique muscular fibres, with a circular sphincter at the pylorus and the cardia. There are two distinct movements: (1) The rotary, rubbing movement, by means of which the walls of the stomach lying in immediate contact with the ingesta move to and fro with a slow, displacing movement, which movements succeed one another periodically, each cycle occupying several minutes; (2) a peristalsis of periodic recurrence in conjunction with rhythmic opening and closing of the pylorus, as a result of which the partly dissolved gastric contents are little by little propelled into the duodenum, commencing after an interval of about five minutes and ending at about the fifteenth hour. Each peristaltic wave lasts about twenty seconds, with an interval of from fifteen to twenty seconds. The peristalsis is most active from the pyloric antrum to the pylorus; and the longitudinal fibres passing toward the pylorus, in contracting, cause dilatation of the pylorus, especially when the pyloric antrum is full.

These preceding physiological ideas are dependant to a certain extent upon the work of Cannon (Landois gives Cannon credit), who summarizes his studies, in part, as follows: The stomach consists of two physiologically distinct parts, *i. e.*, the pyloric part and the fundus. The fundus is an active reservoir for the food; while over the pyloric part, when food is present, constrictive waves are constantly carrying the food towards the pylorus, through which the contents are gradually squeezed. The stomach is emptied by the formation, between the fundus and antrum, of a tube along which constrictions pass. The food in the pyloric portion is first pushed forward by the running wave, and then by pressure of the stomach wall is returned through the ring by constriction, thus mixing the food thoroughly with the gastric juice in the pyloric part of the stomach. The food in the fundus is not moved by peristalsis and is, therefore, not mixed with the gastric juice, permitting salivary digestion until stopped by the acid gastric juice. The pylorus does not open at every approach of peristalsis, but only at irregular intervals. The arrival of a hard morsel of food causes the sphincter to open less frequently, thus materially interfering with the passage of already liquefied food. The constriction waves have therefore three functions: the mixing, trituration, and expulsion of the food. Cannon states that at the beginning of vomiting, the gastric cavity is separated into two parts by a constriction at the entrance to the antrum: the cardiac portion is relaxed and the spasmodic contractions of the abdominal muscles force the food through the open cardia into the esophagus.

Pfahler contends that abdominal contractions serve to stimulate peristaltic movements and mix the food in the stomach, as he has given an ounce of bismuth to a patient after an ordinary meal and noted the bismuth to be thoroughly mixed with the food in a minute or two. The abdominal contractions assist in emptying the stomach by raising it so that it serves as a reservoir, thus relieving obstruction caused by a kink in the duodenum, and by stimulating peristalsis.

Gross discusses the motor mechanism as due to the harmonious action of three phases of motility: (1) The first phase occurs in the fundus, consisting of rapidly succeeding, flat, undulating motions of slightly progressing character, with slight oscillations of contraction around the

gastric contents, which maintain a certain tonus of the stomach walls. The contractions deepen only when they reach the lowest point of the greater curvature, and they gradually increase in depth toward the pylorus. There is a corresponding similar contraction visible upon the lesser curvature. Gross describes a sphincter antri pyloric, resulting from the exhibition of the contraction of the lesser and greater curvature, at a point about four finger-breadths from the pylorus. Holzkecht describes a concentric peristalsis of this pyloric area. However, the studies in bio-roentgenography do not substantiate this contention of Holzkecht and Gross. (2) The second phase of gastric peristalsis occurs in the antrum pylori or so-called accessory stomach. Vigorous power is exhibited here; the contractions are longer, and are tonic in character. Gross describes a leech-like shortening in the longitudinal direction, by means of which the fluidified food is pushed through the pylorus into the duodenum. (3) The third phase notes a subsidence of the powerful antral peristalsis; and the food morsels which have not been propelled forward, float back into the stomach cavity through the now relaxed so-called sphincter antri-pyloric. Gross even considers that there may be a slight antiperistalsis even in the normal, but it is generally conceded that antiperistalsis is a symptom of pyloric stenosis.

Before passing to the influence of pathological processes upon gastric motility, it may be well to consider the relation of the tonicity of the stomach muscles to peristalsis. There is a difference between the tonic action and the peristalsis, and Barclay aptly defines the stomach as a potential space which should contract upon its contents in such a manner that the tubular form is maintained until the stomach is empty. The tonicity, being under the control of the central nervous system, may be altered rapidly, as may be observed when one suffers a sinking feeling accompanying nausea, sudden fear and disgusting smells. This sensation is also accompanied by actual relaxation of the tonicity, and the lower border of the stomach drops, while in retching and vomiting we have an increase of tone and elevation of the stomach outlines. Loss of tone is associated with loss of appetite, while appreciation of food tends not only to stimulate the flow of gastric juice, but increases the tone. Atony is not found in gourmands. Atony of the stomach is defined as the failure of the muscles to maintain the tubular form against the forces of gravity. In the mildest degree of atony the food is held up for a short time and then gradually gravitates to the lowest part, with always some evidence of tubular formation remaining even after a prolonged period; if there is marked atony, food straightway gravitates to the lowest part and only the lower border can be outlined. Frequently at operations the stomach, which has appeared at the x-ray examination to be quite normal, is found as a large flaccid sac, and vice versa. This discrepancy is accounted for by the fact that nausea and disgust will cause relaxation of tonic action, *i. e.*, the stomach will become a large atonic sac, whereas in retching or vomiting it is contracted up. Anesthetics paralyze the involuntary muscle of the stomach; consequently the condition found at the operation is that in which the muscle happened to be when the anesthetic acted upon it.

Barclay finds peristalsis to be variable in quantity, easily excited, inhibited, altered in force, or by character in food, tone, and influence from uncontrollable factors. He considers an excessive peristalsis only where waves actually meet to segment the shadows near pylorus, which is regularly encountered in lesions near the pylorus or some obstruction. Peristalsis may be absent and not to be proved in some stomachs with perfect tone, or with

pyloric obstruction. In such cases, which came to be operated upon, there was extensive carcinoma, or ulceration near the pylorus, or upon the lesser nerves that pass from the pylorus through this area direct to the gastric muscle. Conversely, good peristalsis may be present in the stomach with no tone. Chronic pyloric obstruction gives rise to retention of food. If the tone is good we see broad fluid below the air, which ripples and splashes when patient is shaken.

Holzkecht considers the gastric motor phenomena, when studied by the *x*-ray fluoroscope, to present the following information: There is no active movement in the cardiac portion but there are deep contractions upon the lower portion of the greater curvature, which travel toward the pylorus, gradually becoming deeper until they reach a maximum depth at what Holzkecht calls the sphincter pyloric, a point three or four finger-breadths above the pylorus. Opposite to this deep constriction, which is energetic and persistent at the entrance to the pyloric area, there occurs a similar depression upon the lesser curvature, called the *incisura angularis*. There is no movement of the upper part of the lesser curvature visible by *x*-rays. But the depressions of the lesser and greater curvature eventually meet so that there appears upon the fluorescent screen a distinct, clear line between the shadow of the contents of the corpus and antrum. The shadow of the antrum disappears gradually, its contents being emptied into the duodenum by a process of concentric contraction. The constriction, three or four finger-breadths above the pylorus, has the effect of a sphincter which periodically cuts off the antrum from the body of the stomach. Holzkecht is undecided as to whether there is a simultaneous peristaltic movement of the circular contraction toward the pylorus or whether this circular depression remains stationary and the evacuation is brought about by a contraction of the longitudinal fibres alone. Rieder, Kaestle, and Rosenthal differ from Holzkecht in their interpretation of the movements of the pyloric region. They doubt the division of the stomach into two different parts from their bioroentgenographic examinations, and further state that anatomists fail to show any trace of a transverse muscular band, or anything in the nature of a true sphincter at the entrance to the antrum pylori. Their tracings show that formation of the new antrum does not commence at the spot where the final emptying of its contents occurs, and is therefore not a mere relaxation of the contracted walls. If we adhere to the idea of an antrum pylori, then it is necessary to speak of two such antra existing side by side and at the same moment. We must speak of an old and a new antrum. As the old antrum disappears, a new antrum is developed from the wall of the body of the stomach. This new antrum passes pylorus-wards, and ultimately takes the place of the old antrum, while another new antrum begins to form. In their opinion there is no true antrum pylori, any more than there is a sphincter pylori, in the sense of the older observers; what they see in the regio pyloric is an increase in the energy of the gastric peristalsis and an increase in the height and depth of the wave summits and depressions.

These investigators consider the peristaltic depressions, apparent upon the greater curvature, to be of less depth than Holzkecht infers, and should be described as a valley instead of a depression, which, however, still occurs opposite to the *incisura angularis* of the lesser curvature. They consider that this contracting depression from the lesser curvature dips into the stomach contents and shovels them on towards the pylorus.

By the time one of these scooping contractions reaches and vanishes at the pylorus, another has started with its base at the same place as its predecessor. Knowing that the pylorus can remain shut even during the contraction of the pyloric portion of the stomach, one infers correctly that there is a reverse stream of a portion of the pyloric contents into the stomach sac. It is calculated thus: Supposing that the pyloric portion will hold about one-tenth of the stomach contents; then assuming that there is no back current, the stomach will empty itself in ten contractions, *i. e.*, in ten times twenty-two seconds, or four minutes. However, it takes several hours for the stomach to release a bismuth meal. It is therefore clear that the antrum or pyloric area returns the greater portion of its contents into the stomach sac.

Probably of greater physiological interest, and certainly of great value to the internist, are the studies of Cannon upon the passage of different food-stuffs through the stomach. In experiments upon cats, he found that gastric peristalsis was slower for fats (5.2 waves per minute) than for the carbohydrates (5.8 waves per minute). Fats remain long in the stomach and their discharge into the duodenum begins slowly and continues at nearly the same rate at which the fat leaves the small intestines by absorption and passage into the large intestine. Carbohydrates leave the stomach soon after ingestion, passing out rapidly, and at the end of two hours reach a maximum amount in the small intestine. The carbohydrates remain in the stomach only about half as long as the proteids. Proteids frequently do not leave the stomach at all during the first half hour. After two hours they accumulate in the small intestine to a degree only slightly greater than that reached by carbohydrates an hour and a half earlier. Egg albumin is exceptional in that it leaves the stomach at about the carbohydrate speed. When carbohydrates are fed first and proteids second, the presence of proteid in the cardiac end of the stomach does not materially check the departure of the carbohydrate food lying at the pylorus; but the reverse does check the outward progress of the carbohydrates. When proteids and carbohydrates are mixed, the discharge is intermediate in rapidity. Mixing fats and proteids, or fats and carbohydrates, further reduce the rate of exit of both proteids and carbohydrates. Doubling the amount of carbohydrates increases the rapidity of the carbohydrate outgo during the first two hours; doubling the proteids delays the initial discharge of proteids.

While stating that gastric peristalsis seems to sweep towards the pylorus from the middle of the greater curvature, even regardless of an artificial opening of a gastro-enterostomy, Barclay thinks that the food-stuffs pass to the pyloric antrum in the order in which they are taken or eaten unless a heavier food should succeed a lighter one. To verify this observation that food-stuffs take positions according to their specific gravity, Barclay cites a case in which bismuth food was given and shown at the bottom of the stomach. Then ordinary food was given without bismuth, which did not cast a shadow. Then bismuth and milk were given which entered the stomach rapidly and outlined the whole contents. Rapidly there succeeded definite shadows in layers of the three ingested masses. No appreciable mixing ensued, but apparently the fluid swallowed flowed around the mass to the pylorus unobstructed, leaving the bismuth taken with the milk as the third and upper layer of the contents.

Peristalsis of the stomach musculature is a normal function, but an active peristalsis does not presuppose a normal pyloric discharge of stomach contents. Further, the discharge function of the pylorus does not

depend upon the peristalsis of the stomach. On the contrary, a stenotic pylorus will produce a vigorous peristalsis in a stomach with good tonicity, or in a stomach with a compensating hypertrophic musculature. The stenotic pylorus will even produce an antiperistalsis. The latter, however, may also be produced by other changes in the pyloric area and will be discussed later in this review.

The mechanism of the functioning pylorus is interesting. What produces the opening and closing of the pylorus? Does the pyloric orifice open because the food at the pylorus contains some free or an excess amount of acid content, and then does it close because the alkaline duodenal secretion promptly neutralizes this free acid content and closes the pylorus? Does a hyperacidity indicate that the gastric ulcer or erosion is situated at the pylorus, and that the organic nature of the lesion or the spasticity, produced by the irritation of the lesion by excessive acidity, accounts for the stenosis of the pylorus, which may be either a spasmodic functional condition or an organic one? If the acidity of the stomach contents is responsible for the proper discharge of stomach contents, why give soda and alkalis to relieve gas formation in functional disturbances; rather give something to increase the acid content and promote the exit of food-stuffs.

Barclay and Cannon both assure the segmentation or layer formation of the stomach contents, thus making possible a carbohydrate digestion in the cardiac end of the stomach and the gradual aggression of the gastric acid digestion by the pyloric antrum. We are brought to the conclusion that the real gastric acid digestion occurs only in the pyloric antrum, and that the normally and gradually acquired acidity of the antral contents produces the opening of the pylorus when digestion of proteids has progressed to the point where there is a slight local hyperacidity.

The mechanism controlling the relaxation of the sphincter pylori is obscure. It does not relax with the approach of each wave, but at irregular intervals. Cannon connects it with the consistency of the food, in that solid objects forced against the pylorus prevent its relaxation and retard the exit of chyme. Liquid food alone passes rapidly. Howell considers the sphincter to be in a state of tonic closure with a certain orderliness in its relaxation, especially in the separation and ejection of the more liquid from the solid parts of the stomach contents.

The stomach receives its nervous supply from the splanchnic and vagi nerves. The vagi fibres are motor and promote contractions when stimulated. The splanchnic fibres are inhibitory and produce a dilatation when stimulated. Movements of the stomach may be stopped by anxiety, rage or distress as has been proved by Cannon.

Howell contends that the stomach is an automatic organ which is merely regulated by these extrinsic nerve fibres, as the stomach will continue movements when excised if it is kept warm. Gastric digestion may continue normal also after a section of these extrinsic nerve fibres. Howell says that the stomach may be considered just as automatic an organ as the heart. Leonard discusses the relation of wave form to functional activity in the stomach as determined by radiographic studies. He says that deficient functional power may be present in stomachs that conform in shape to those having perfect function. The significance of the wave form is determined in the individual case by the functional efficiency enabling the stomach to empty itself in a given time. Exclusive of new growths, ulcerations, cicatrices and ptosis, the most frequent interference in functional efficiency is noted in dilatations. Dilatation of the stomach

may be passive, owing to a muscular atony or a lack of intra-abdominal support. An active dilatation with hypertrophy of the musculature is usually caused by the organic or spasmodic stricture of the pylorus. By both *x*-ray negatives and the fluoroscope the presence of an abnormal residue of bismuth porridge may be determined, and is indicative of a lack of motor efficiency. To differentiate between the passive or asthenic dilatation, or the active or sthenic hypertrophic dilatation of the stomach, the *x*-ray should be used to study the type of peristaltic wave displayed by the stomach. The form and amplitude of the peristaltic wave shows a constant relation to the amount of work to be accomplished, the character of the food ingested, the position of the patient during the examination, and the amount of the gastric contents. This normal form and amplitude or wave varies in pathological conditions. The passive or asthenic gastrectasis provides practically no peristalsis in the erect position of the patient, and in the recumbent position there is only a slight wave form. The active or sthenic gastrectasis provides a wave of greater volume and less frequency, and is more pronounced if the patient is recumbent. In cases of gastrectasis due to obstruction we find this active peristalsis. Leonard draws attention to the therapeutic value of rest after eating for all cases of motor insufficiency, since the peristaltic waves are increased in strength in the recumbent posture.

The fact that ulcerations and erosions interfere with the normal exhibition of peristaltic waves was discussed at length in a previous review upon gastric ulcer, published in this JOURNAL in February, 1911. Rieder, Haudek, Faulhauber, Holzknicht, Jonas and others have published reports of radiographic examinations displaying such findings, which were subsequently verified by operation. Mitchell, in describing the use of the phonendoscope and percussion for studying gastric sounds and peristalsis, says that a peristaltic wave cannot pass over an eroded area. This is what we find in other parts of the body, where the muscular fibres hold rigid when overlying mucous membranes are eroded. Again, spasmodic contractions at the site of an ulcer may be excited by the highly acid nature of gastric contents.

Antiperistalsis, or peristaltic waves running from the pylorus toward the greater curvature, may generally be considered as a pathological condition. Jonas maintains that antiperistalsis does not depend upon chemical irritation, but occurs when substances within the stomach are too large to pass the pylorus; and that where there is a pyloric stenosis the stomach contents are relatively not finely divided enough to pass the narrowed lumen of the pylorus and remain in the stomach for some time before becoming finely divided enough to pass on. During this abnormal delay in subdivision or transition into chyme antiperistalsis manifests itself. Schwarz has noted antiperistalsis where there was a narrowed lumen of the pylorus due to cicatricial contractions or infiltrations near the pylorus from ulceration and in cases of duodenal stenosis. Haudek considers that *antiperistalsis occurs always from organic changes in the walls of the stomach at or near the pylorus*. He cites 5 cases with antiperistalsis without symptoms of pyloric stenosis, but in which ulcers were present near the pylorus, and some 40 cases manifesting antiperistalsis, fluoroscopically, one-half of which came to operation. Of the latter, several showed ulcer upon the lesser curvature with normal pylorus; one presented an infiltrating carcinoma free from the pylorus; one had a duodenal stenosis with adhesions to the posterior wall of the stomach, and in the remainder the antiperistalsis was due to pyloric stenosis.

It is to be remembered that the facts brought out in the above review have been determined by the use of the x -ray, either fluoroscopically, or by the use of photographic plates. The study of wave forms and peristalsis is naturally studied best by the use of a large fluoroscopic screen by means of which the moving parts may be seen in action. Deducing wave form from negatives is hazardous, and will lead to wrong conclusions all too frequently. Constant attention to methods of protection to both operator and patient is enjoined. An appreciation of the advantages of ocular accommodation to fluoroscopic shadows in a totally dark room is necessary to successful diagnosis.

Mayo (Wm. J.) aptly says that the stomach has been credited with a host of diseases which it never possessed, and has received an amount of treatment for supposititious conditions which is of little credit to the medical profession. In this respect the stomach resembles the urinary bladder, the supposed diseases of which have been so greatly reduced since the cystoscope, ureteral catheter, x -ray and other means of direct inspection have come into general use. Mayo thinks we have paid relatively too much attention in the past to the chemistry of the digestive process and too little to the more important function of motility. Mayo epigrammatically says: "Mistakes in diagnosis are more often the result of a lack of examination than a lack of knowledge."

It remains for the profession to familiarize themselves with the possibilities of the x -ray in gastro-intestinal diagnosis. The study of the motility afforded by the fluoroscope, with proper apparatus, cannot but impress the internist and surgeon with the additional diagnostic facts thus determined.

PRACTICAL MEMORANDA.

ADHESIVE PLASTER IN WOUND DRESSING.

By JOHN YOUNG BROWN, M. D., of St. Louis.

In applying adhesive plaster to retain dressings following a surgical operation, the surgeon is frequently annoyed by the failure of the plaster to stick to the skin. This difficulty can readily be overcome by spraying with ether the surface to which the plaster is to be applied. The ether causes the skin to dry quickly and the adhesive plaster quickly takes hold. Cotton should always be placed on the gauze. By so doing, the plaster not in contact with the skin can be readily turned back by cutting in the centre. The dressing can be changed, and by the use of tape the adhesive bandage is again adjusted, thus avoiding the annoyance and pain or removing the plaster at each dressing.

TO PALPATE NORMAL OR SLIGHTLY ENLARGED SPLEENS.

By CREIGHTON WELLMAN, M. D., of Oakland, Cal.

In working with nervous or fleshy individuals, by having the patient sit or stand with the chest and shoulders loosely hanging forward (as is naturally done by many who stand and sit incorrectly), the physician also standing or sitting, facing the patient and to his left, can insert the fingers of the left hand far under the ribs and determine the character of the spleen in a manner otherwise impossible.

DIAGNOSIS OF TUBERCULOSIS OF THE INTESTINE.

By F. M. POTTENGER, M. D., of Monrovia, Cal.

For many years physicians have considered the presence of tubercle bacilli in the feces as being absolute evidence of tuberculosis of the intestines.

Recent experiences, however, show that this cannot be relied upon. In the Pottenger Sanatorium we have made over 600 examinations of the feces of tuberculous patients and have found tubercle bacilli present in about two-thirds of the advanced cases.

These bacilli find their way into the feces through swallowed sputum. In order to reduce this source of bacilli to a minimum, samples are taken with the following precautions.

When the patients arrive in the institution we instruct them thoroughly as to the danger and undesirability of swallowing sputum, and impress

FOOTNOTE: A department for the presentation of new or but little known points in diagnosis and differential diagnosis; therapeutic observations; special formulæ; medical, surgical and laboratory technique; and new instruments and appliances. These "Memoranda" are contributed to the INTERSTATE MEDICAL JOURNAL by the authors to whom they are credited.

upon them extreme care. Then we wait one week so that the alimentary canal will be well cleaned out before taking the sample. But even with this precaution, patients constantly swallow bacilli. Therefore, finding bacilli in the stools means nothing so far as diagnosis of tuberculosis of the bowel is concerned.

The seat of tuberculosis of the bowel is usually at the lower end of the small intestine—the appendix, cecum, or ascending colon. The symptom of rigidity of the muscles in case of appendicitis is well known. I have found that those portions of the intestine, which are most apt to be involved in tuberculosis of the bowel, reflect also in the superficial muscles on the right side; consequently, if the examiner will palpate very lightly but carefully over the abdomen, he will find when tuberculosis of this portion of the bowel is present that the rigidity of the muscles on the right side is greater than normal. I have used this sign now for several months and find it very valuable.

THE BACTERIOLOGICAL DIAGNOSIS OF EXUDATES, ETC.

By EDWARD C. ROSENOW, M. D., of Chicago.

The inoculation or vaccine treatment of infections makes accurate bacteriological diagnosis imperative. The differentiation of streptococci and pneumococci, while quite accurately worked out in bacteriological laboratories, is still too often attempted by clinicians and in "clinical laboratories" on the older points of difference, viz.: chain formation, morphology and growth on ordinary culture media. These are often wholly inaccurate and frequently lead to disastrous results. The many mistakes in the identification of the cause of infectious processes, which have come to my notice during the past eight years, prompt me to emphasize some simple yet essential points in technique in the bacteriological diagnosis of exudates, etc. Make at least a Gram stain, counterstained with weak carbo-fuchsin of the material at hand. This serves as a guide to the kind of organisms present and their number. If diplococci resembling pneumococci are found a capsule stain may be made. Of the methods in vogue for staining capsules, the one reported by the writer in the *Journal of the American Medical Association*, February 11th, 1911, has the widest range of usefulness. But even this method is not reliable enough in some instances to differentiate clearly between pneumococcus, streptococcus mucosus and streptococcus pyogenes.

If the pus or other material has been contaminated as is always the case when the discharge has continued for some time, wash it in several changes of broth or distilled water and plate out directly into blood agar plates. Blood agar is prepared by adding approximately 0.5 c.c. of sterile defibrinated blood (human or animal) to each tube of 5 c.c. of melted plain agar after it has cooled to 40° C. The defibrinated blood for this purpose may be kept on ice for a month or longer provided hemolysis has not taken place; samples differ in this respect. The value of blood agar plates and blood containing media is very great because they make a most favorable culture medium for highly parasitic organisms, such as bacillus influenzae, pneumococci, meningococci and gonococci, and which nearly always fail to grow on the ordinary culture media. Its value is far greater than serum agar because the blood serves among other things to differentiate quite clearly between streptococcus pyogenes and pneumococci. The former produces a zone of hemolysis, manifested

by a perfectly clear area which begins immediately around the colony, while the pneumococcus (and streptococcus viridans) produces a zone of green and very occasionally a narrow clear area of hemolysis peripheral to this. These points of difference have never failed in my hands. In the examination of hundreds of stains, I have never seen pneumococcus colonies produce hemolysis which begins immediately around the colony, while pathogenic streptococcus pyogenes always produced more or less hemolysis which begins immediately around the colony itself.

Differentiation of green-producing colonies of diplococci may be made by use of inulin. This is not often necessary because streptococcus viridans produces lesions relatively rarely.

In this connection should be emphasized the great value in thorough centrifugation of fluids in which the bacteria may be relatively few, such as cerebrospinal fluid, pleural, or peritoneal. The smears and cultures should be made from the sediment and as early as possible after they are withdrawn.

HOW TO MAKE CARDIO-DILATORS.

By JESSE S. MYER, M. D., of St. Louis.

In a paper read before the American Gastro-Enterological Association and published in the *Journal of the American Medical Association*, October, 1910, the writer described a simple method of dilating cardio-spasm. Since the publication of this article many inquiries have been made as to where the cardio-dilators could be obtained. In each case I have had to explain that the dilator is made upon the same principle as those used by Russell, Strauss, Plummer, and others, but that the ones used by me are prepared in my office. I take this opportunity, therefore, of describing their preparation a little more minutely, with the hope that others who have occasion to use this appliance may find the same satisfaction in their preparation that I have. Instead of using the ordinary sized stomach-tube, I have employed the nasal tube, size 22 F. to 24 F., without any opening in the end, and make two openings in the side at the points desired. A tube of this calibre can be much more readily introduced through the stricture than the tube of ordinary size. The dilating bag consists of two layers of rubber, one inside and one outside of a china silk bag which can be made any size that is desired. For general use I have found a bag about 3 cm. in diameter applicable in most cases. The rubber used in the preparation of these bags is commonly known as Penrose drainage tubing and can be obtained in yard lengths and in different diameters. Sizes 4 and 6 respectively are used for the inner and outer bags, and the silk bag of a sausage shape is inserted between. These are fastened to the end of the stomach or nasal tube by tightly winding the ends with silk thread attaching one bag at a time. In order to make this tube more rigid for the introduction, a mandarin made from the ordinary dental engine cable is employed. After the bag has been inserted to the proper point, the mandarin is withdrawn and a large glass syringe, such as is used for bladder irrigations, is attached filled with water. With this gradual dilatation is made until the desired pressure has been exerted.

CORRESPONDENCE

PARIS LETTER.

ACUTE ANTERIOR POLIOMYELITIS AND ANIMAL EXPERIMENTATION.

By AUGUSTE A. HOUSQUAINS, M. D.

The question of the contagiousness of infantile paralysis is at present occupying the minds of physicians more than any other question. And this interest in the question is not purely theoretical; it also has its practical side, and this is of the greatest importance since this disease may at any time become epidemic. This, at least, is the thought which seems to prevail, though at present there is no unanimity of opinion among physicians, for the authenticity of epidemics of infantile paralysis has been questioned by certain authorities.

The proofs which we have of the infectious nature of acute anterior poliomyelitis are incontestible. In 1888 Cordier was the first one in France to publish an account of a veritable epidemic of infantile paralysis. According to him, in a village of 1,500 inhabitants he observed, in the course of three months, 13 cases of the affection known and described under the name of infantile paralysis on account of the alteration in the anterior horns of the spinal cord. The author noted the intensity of the fever, the concomitance of the convulsive phenomena, and was struck with the fact that the upper limbs were affected in many cases and that the medulla oblongata and the lower end of the fourth ventricle were not always free from changes. Cordier concluded that the atrophic paralysis was in reality an acute infectious disease depending on a general infection which localizes itself by preference in a circumscribed region. Médin studied the epidemic, which occurred at Stockholm in 1887, with great precision. It is necessary here to remember that it was Bergenholz and Oxholm who described the first epidemics of infantile paralysis.

With the knowledge gleaned from the thorough work of Cordier and Médin, M. Pierre Marie elaborated the conception of the infectious nature of infantile paralysis. Nothing is more striking, in fact, than the febrile onset and the general phenomena which mark the beginning of the affection, than the perivascular inflammatory lesions which explain the mode of penetration of the virus into the anterior horns of the cord. Moreover, adds M. Marie, do we not know that infantile paralysis may result after divers infectious diseases, such as measles, typhoid fever, etc.? These allied facts, in regard to the existence of epidemics that are clearly outlined, can only corroborate the infectious theory of acute anterior poliomyelitis.

But the question of the infectious nature of the disease is less simple than it at first appears to be if we limit ourselves exclusively to the above facts. Physicians have pointed out for some years that a certain number of epidemics due to cerebrospinal meningitis bear an analogy to acute poliomyelitis, and certain authors have published accounts of "so-called infantile paralysis." These opinions have perturbed the minds of many physicians so greatly that the question of infectiousness is still a matter for discussion. But taking into consideration the articles which have recently been published, the conclusion that we arrive at to-day is almost general, though not unanimous, that the authenticity of the epidemics of infantile paralysis cannot be contested; a fact which contributes to a great degree in confirming the opinion as to the infectious origin of the classic type of sporadic infantile paralysis which was held by M. Pierre Marie. Moreover, the recent experimental researches have given considerable support to the theory of the infectiousness of this disease.

Let us admit at once that though the pathogenic agent of this disease is not known at the present time, its existence is no longer a matter of doubt. If we have not been able to isolate it, the cause must be attributable to its dimensions being so small that it cannot be seen by the microscope or the ultramicroscope. In fact, this pathogenic agent is able to pass through filters no matter how closely woven the paper is. Similar to the pathogenic agent of rabies and vaccine it is a filtrable virus. Certain experimenters have described a diplococcus as being the microbe of infantile paralysis, but this has never been satisfactorily proved. As Levaditi remarks, these experimenters have not as yet given us such proofs that all doubt would be set aside.

Flexner and Lewis have furnished us with interesting results by treating a culture of the virus of poliomyelitis with a bouillon to which are added serum and ascitic fluid. Levaditi has arrived at similar conclusions—namely, if one grows the filtrates containing the active virus, the fluid of the culture thickens at 37 degrees C. By employing the process of coloration advocated by Loeffler, Levaditi succeeded in revealing in the bouillon, at the bottom of a crucible by centrifugation, very small corpuscles which were more or less round. But it is still impossible at the present time to have a precise idea of the morphology of the parasite which causes acute poliomyelitis.

Experimenters have been more successful in their attempts to reproduce the disease in monkeys. Levaditi has made a complete study of the question and we learn from his work the following details. The disease can be reproduced in the monkey by inoculation. To do this an emulsion of certain tissues or organic fluids are taken from a child that has died during the acute period of the affection. The virus is found in the cord and the brain, in the nerves, in the nasopharyngeal mucous membrane, in the lymphatic ganglions, in the salivary glands, in the blood, and in the spleen. To inoculate an animal (usually a monkey and occasionally a rabbit) the virus is introduced either in the brain, the sub-arachnoidian space, the sheath of the nerves, the peritoneum, the mesenteric vein, the subcutaneous cellular tissue, or in the anterior chamber of the eye. The intracranial injection was successful in 90 out of 100 experiments. The reproduction of the disease was obtained also by the introduction of the virus in the stomach by means of a sound, by intratracheal injection, and by friction on the nasal mucous membrane with or without scarification. Hence we see that the portal of entry is by means of the digestive, or the respiratory tracts, a matter which from an etiological

and prophylactic point of view is of considerable importance. The resistance of the virus to physical agents is considerable and its vitality explains the facility with which it can be transferred to any distance. It is easily destroyed by ordinary antiseptics.

In the monkey the period of incubation is from three days to two weeks, the average being from eight to nine days. In man the duration of the incubation is longer. This period of incubation in the monkey is reckoned from the time the virus is introduced until the disease is propagated in the organism. The pathological anatomy shows that the disease travels the length of the vessels, probably in the perivascular lymphatic spaces; it sometimes attacks the tissues of the nerves themselves. Levaditi has shown that by injecting the virus in the median nerve, a paralysis results which localizes itself at first in the corresponding medullary territory.

The question as to the mode of contagion has not been elucidated. The presence of the virus has never been satisfactorily shown in the feces or in the urine. But we do know, that if we extirpate a section of the nasopharyngeal mucous membrane of an inoculated monkey and then scrape it, that the filtrate of the inoculated liquid obtained can reproduce the affection. The nasopharyngeal passage is, at the same time, not only a means of infection but a means of disseminating the disease.

What is the degree of immunity conferred by one attack of the disease? The mortality of inoculated monkeys is from 50 to 100 per hundred, that is to say, few survive, but it has been observed that those that are cured are refractory to a new inoculation. But this immunity appears to be only temporary.

Attempts have been made to create immunization against the disease. On account of the analogies between it and rabies recourse has been made to the means employed by Pasteur in the matter of antirabic immunization. By dessicating, by means of potash, fragments of the cord, Pasteur obtained, as we know, an attenuation of the virus which permitted, by repeated inoculations and increasing doses, the immunization of subjects. But in poliomyelitis the virus is very resistant to dessication, its action remaining too violent and from time to time inoculating the patient.

It has been stated that the serum of animals which have survived an attack of poliomyelitis contains antibodies which neutralize the action of the virus. A mixture containing equal parts of serum and the infected substance does not reproduce the disease. The same results can be obtained if the blood of a child, cured by an attack of epidemic acute poliomyelitis, is employed, or according to Netter and Levaditi, if the blood taken from a case of sporadic infantile paralysis is used.

The conclusion which we arrive at from these facts is that there is an identity between classic infantile paralysis and the epidemic form, since the serum of a subject attacked by the first disease contains immunizing substances which protect from the epidemic type. Therefore, we cannot but entertain the possibility of the discovery, at an early day, of the formula for a preventive, or even a curative, serum, the action of which will have its greatest effect on the cells of the anterior horns of the cord which have not as yet been destroyed.

April 10th.

DIAGNOSTIC AND THERAPEUTIC NOTES.

THE TREATMENT OF ASCITES BY MEANS OF SUBCUTANEOUS DRAINAGE.—Paterson (*Lancet*, October 29th, 1910). The writer has modified the procedure of Handley, described some months ago in these columns, with satisfactory results. He uses glass spools, consisting of a short glass tube with a disc-shaped flange at each end. The abdomen is opened in the median line just below the navel and a portion of the omentum resected, to prevent this organ from later occluding the lumen of the tube. At one edge of the wound, the skin is then undermined up to the linea semilunaris and at this point an opening is made into the peritoneal cavity of such a size that the glass spool fits into the opening like a button, being held in place by the flange at each end. The subcutaneous tissue is then sutured to the anterior sheath of the rectus, whereby a closed reservoir results into which the ascitic fluid can drain. The wound is then closed. The immediate result is the formation of a large fluctuating tumefaction, which, however, is soon absorbed, being replaced by a more or less permanent edema. Paterson has used this method in a number of cases of cirrhosis and peritoneal cancer, with satisfactory results.

SKIN DESINFECTION BY MEANS OF AN ALCOHOLIC SOLUTION OF TANNIN.—Zabludowski (*Deutsch. med. Wochenschr.*, 1911, No. 9). The writer has devised a method of sterilizing the hands and the field of operation by rubbing the former two minutes and the latter one minute with a 5 per cent. solution of tannin in 95 per cent. alcohol. It has been positively demonstrated that the eminently successful modern methods of skin sterilization by means of alcohol or of tincture of iodine depend less upon the germicidal than upon the "tanning" action of these substances. This power of tanning the skin, in the way in which leather is tanned, is possessed in a still higher degree by an alcoholic solution of tannin. A series of bacteriologic investigations of areas of skin rubbed five minutes with iodine-benzine-paraffine, four minutes with alcohol-acetone, five minutes with 95 per cent. alcohol and two minutes with 5 per cent. tannin-alcohol, have in the writer's hands, proven that the latter method alone results in nearly or quite complete sterilization. Moreover, whereas all the other iodine or alcohol methods fail entirely if the skin has previously been washed with soap and water, this procedure does not seem in the least to interfere with the successful use of tannin-alcohol. If Zabludowski's findings are confirmed by others a new, efficient and convenient method of skin sterilization will be at our disposal.

THYROID EXTRACT IN ARTHRITIS DEFORMANS.—Wilson (*Brit. Med. Journ.*, December 3rd, 1910). In two cases of arthritis deformans, Wilson noted a marked objective and subjective improvement following the administration of thyroid extract. He believes that this therapy is es-

pecially indicated in cases of so-called chronic villous arthritis, a condition which he considers due to a thyroid insufficiency.

We ourselves have used thyroid extract in a number of cases of this affection, but have been unable to convince ourselves of its therapeutic efficiency. The dried thymus gland, on the other hand, when given in doses of 15 to 20 grains daily has occasionally produced strikingly good results, though even in these cases, the end-result was palliative rather than curative. Our therapeutic resources in this distressing affection must still be considered unsatisfactory.

THE THERAPEUTIC ADVANTAGES OF COLLOID MERCURY.—Stephens (*Brit. Med. Journ.*, December 17th, 1910.) Stephens contends that colloid mercury is in certain respects greatly superior to other forms of this metal. It is antiseptic to a high degree, non-irritating, non-corrosive and relatively non-toxic. He uses it in a $\frac{1}{4}$ to $\frac{1}{2}$ per cent. aqueous solution for the cleansing of wounds, in herpes tonsurance in alopecia and as a mouth-wash and spray in diphtheria and tonsillitis. Internally he recommends its use in acute gastritis and as an anti-syphilitic. It is best administered in a one per cent. solution, of which the dose varies from 3 drops for children to 30 for adults. Gastro-intestinal disturbances, salivation and the like were never observed, even after the use of relatively high doses.

GONORRHEAL ARTHRITIS AND ITS TREATMENT.—Murrell (*Edin. Med. Journ.*, 1910, No. 10.) Murrell has found the various antigonococcus sera entirely worthless. He believes this to be due to the fact that the gonococcus is not pathogenic for horses and apes and that these animals are therefore not competent to produce a gonococcic anti-serum. The vaccine treatment on the contrary he finds extremely efficient, especially where it is possible to produce an autogenous vaccine. He favors small and frequent doses rather than larger ones at longer intervals.

PERMANENT RESULTS OF ARTIFICIAL PNEUMOTHORAX IN ADVANCED PULMONARY TUBERCULOSIS.—Spengler (*Muench. med. Wochenschr.*, 1911, No. 9.) From time to time favorable communications in regard to the results of artificial pneumothorax in pulmonary tuberculosis have appeared in the literature, but none so striking as those recently reported by Spengler. Before a permanently favorable result of the procedure can be assumed, he demands that it fulfil the following three criteria:—

1. The pneumothorax must have disappeared at least nine months ago. For this reason, a number of his cases that demanded repeated injections and all of those so treated in 1909 and 1910 must be excluded.
2. The patient has neither fever, nor cough, nor sputum. Where the latter has persisted it must be free from bacilli.
3. All patients must be entirely well or at least be fully able to do their work.

Spengler reports 15 cases that fulfil these requirements. All of them were cases of advanced pulmonary tuberculosis, most of them with cavities, their ages varying from eleven to forty-three years. The prognosis before operation seemed hopeless in 12 cases and bad in 3. In 7

cases, an exudate resulted from the pneumothorax; in 7, the pneumothorax remained dry; in 1, the pneumothorax was produced in the presence of a pre-existing exudate. It is essential that one lung be practically free from any tuberculous involvement.

The cases are reported in some detail, for which the reader must be referred to the original article. The results were so astonishingly good, that, in view of the high standing of the man reporting them, they should lead to a wider use of the procedure in apparently hopeless cases.

DILUTE SOLUTIONS IN V. PIRQUET'S TEST.—Wallerstein (*Berl. klin. Wochenschr.*, 1911, No. 10.) Incipient, but active cases of tuberculosis, give a distinctly positive cutaneous reaction, according to the method of v. Pirquet, with a 1 per cent. solution of tuberculin, whereas the latent cases rarely, if ever, react with solutions weaker than 5 per cent.. Advanced cases, on the other hand, require still stronger concentrations for eliciting a positive cutaneous reaction; indeed the more severe the tuberculous infection, the more concentrated the solution required. In this way, the writer believes it possible to determine the degree of infection, by means of the cutaneous inoculation with a series of solutions of tuberculin of varying concentration.

A NEW METHOD OF PERFORMING GASTROSTOMY.—Lefaro (*Deutsch. Zeitschr. f. Chir.*, Vol. 108, Nos. 3 and 4, 1911.) As yet Lofaro's method has been attempted only upon the cadaver and in dogs. It is however so novel and of such interest that it deserves attention. The abdomen is opened as usual in the median line. Thereupon the left rectus muscle is divided transversely and the incision carried through into the abdominal cavity. Through this transverse slit, a portion of the stomach is drawn, fixed to the wound and a lateral opening is made, while the original median incision is closed. Lofaro's experiments indicate that this method results in an ideal continence. It seems to deserve a trial.

THE INFLUENCE OF APPETITE UPON THE STOMACH CONTENTS.—Fischer (*Muench. med. Wochenschr.*, 1911, No. 7). Pawlow has shown by means of physiologic experiment that the presence or absence of appetite exerts a decisive action upon the flow of gastric juice that follows the ingestion of food. Fischer's observations confirm those of other clinicians that the degree of acidity of the stomach contents varies greatly according to the palatability of the test meal. Many patients have such an aversion to the Ewald breakfast or the Riegel dinner, that the stomach contents obtained after their ingestion give an entirely erroneous picture of the true state of gastric secretion. Fischer believes that it is far better to allow the patient to choose his favorite dish as a test-meal, while he has devised a combination of foods that in his experience has proven sufficiently palatable to all patients for practical purposes. While we are not inclined to go quite as far as Fischer and those who have expressed similar views, we have found the manner in which the Ewald breakfast is served to be of considerable influence upon gastric secretion. If it suffices to hand a clinic patient a few slices of toast and a couple of glasses of water, more delicate feeders require a neatly arranged tray, with linen, pretty china and silver.

BOOK REVIEWS.

MODERN TREATMENT: THE MANAGEMENT OF DISEASE WITH MEDICINAL AND NON-MEDICINAL REMEDIES. By Eminent American and English Authorities. Edited by Hobart Amory Hare, M. D., Professor of Therapeutics and Materia Medica, Jefferson Medical College, Philadelphia; Physician to the Jefferson Hospital; Author of "A Textbook of Practical Therapeutics," "A Textbook of the Practice of Medicine," etc.; assisted by H. R. M. Landis, M. D., Medical Director to the Phipps Institute for Tuberculosis and Physician to the White Haven Sanatorium. In two octavo volumes, comprising 1800 pages, with numerous engravings and full-page plates. Philadelphia and New York: Lea & Febiger. 1911. Price, per volume, cloth, \$6.00; half morocco, \$7.50.

Hare's "Modern Treatment" bids fair to occupy the same place in English and American therapeutics that the classic work of Penzoldt and Stinzing does in German. The entire field of medicinal and non-medicinal therapy has been systematically divided into chapters, each of which has been placed in the hands of an acknowledged master in its special field. The calibre of the contributors will be realized, when we call attention to a chapter on Glandular Therapy by S. P. Beebe, Yellow Fever by Agramonte, Diseases of the Circulation by James Mackenzie, Diseases of Nutrition by E. P. Joslin, Urinary Disorders by James Tyson, to select but a few among the eminent contributors. A book of this sort defies detailed criticism, and a few words of commendation are as adequate as pæans of praise. The composite nature of the work brings with it definite advantages. Each chapter, being written by one whose special interests lie in that direction, is a pronouncement by an acknowledged authority in that field; and the undue attention to one portion of the subject, with corresponding neglect of another, which is inevitable when one or two men endeavor to cover the entire subject of therapeutics is thus avoided. On the other hand, the book tends to become rather a series of monographs than a systematic treatise, and rather to embody the individual views of the contributors than to furnish an impersonal encyclopedic review of the practice of to-day. However, every book must have the disadvantages of its merits.

SYPHILIS: ITS DIAGNOSIS AND TREATMENT. By F. J. Lambkin, Col. R. A. M. C., Lecturer on Syphilology, Royal Army Medical College, London, Late Specialist at the Army Headquarters, India, etc. Preface by Sir Frederick Treves, Bart., G. C. V. O., C. B., LL.D. New York: William Wood & Co. 1911. Price, \$2.25.

This little work on syphilis is a fair and scholarly presentation of the subject; rather an excellent book in many ways and modern in that it treats of the spirochæta pallida, the Wassermann reaction, and the Ehrlich-Hata remedy, but it is old in its outline and didacticism, since the scheme is adhered to of dividing syphilis into stages with its various periods of incubation, etc. Why cannot someone write a modern textbook on syphilis and treat the disease as a pathological entity? Why should a secondary period of incubation be detailed? The disease goes on from the time of exposure, the spirochætæ are pushing their way into the circulation when the disease becomes disseminated throughout the body. This criticism is an illustration of what can be said of all modern books on syphilis—and it seems difficult for medical authors to break away from the beaten track. Yet of all the smaller books on syphilis this is the most modern which we have yet seen. Col. Lambkin is an authority whose word must be highly valued, for his experience has been vast and his medical contributions many, especially upon the treatment of syphilis.

By way of friendly criticism, what would enhance the value of this little book would be a chapter on prognosis, that would make known to us the information which we are sure the author has at his command. And with this

thought in mind we would rejoice in an additional hundred pages in the next edition, so that the modern conception of syphilis and its pathology could be treated *in extenso* and in the same lucid manner which characterizes the author's present style. By doing this both Col. Lambkin and the publishers would confer a boon on all those interested in the study of syphilis.

THE INTERNATIONAL MEDICAL ANNUAL. A Year Book of Treatment and Practitioner's Index. New York: E. B. Treat & Co. 1911. Price, \$3.50.

Next in value to the books which contain new contributions to medical knowledge come those that present these contributions in such a form that they can be used by a wide circle of readers. Of the latter class none fulfils its aim more completely than the "International Medical Annual" which appears in March of each year. This year's issue, the twenty-ninth, is not inferior to its predecessors. Issued by a group of medical men, some of them of considerable eminence and consisting of thirty-three Englishmen, two Americans, two Germans and one Belgian, it covers the entire field of practical medicine so thoroughly that nothing of importance that has appeared in medical literature during the past year will be sought for in the book in vain. The articles are far more than mere abstracts of literature. Under each heading, the work that has recently appeared in that line is presented in a critical and carefully digested form, often so illuminated by the personal experience of the writer, as to rank as an original contribution. Although the bulk of the contributors are English, there is in the book no trace of medical chauvinism. The work of Americans is given full credit, the views of the Mayos being given especial prominence. In this connection it may interest our readers to know that Bartlett's filigree method in hernia operations is finding much favor abroad, four pages and one plate in the Annual being devoted to it. The possessor of a copy of the book, whether he be internist or surgeon, will constantly have occasion to refer to it.

ANAEMIA. By Geh. Obermedizinalrat Professor Dr. P. Ehrlich, Director of the Königl. Institut f. Experimentelle Therapie, Frankfurt A.-M. and Dr. A. Lazarus, Professor of the University of Berlin-Charlottenburg. Part I., Vol. 1. Normal and Pathological Histology of the Blood. Second Edition (Enlarged and to a great extent rewritten) by Dr. A. Lazarus, Professor (Berlin), and Dr. O. Naegeli, Privat-Dozent (Zurich). Translated from the German by H. W. Armit, M. R. C. S., L. R. C. P. (London). With 5 Illustrations in the Text and 5 Colored Plates. New York: Rebman Company. Price, cloth, \$4.00.

Most of our knowledge of hematology is founded upon the epoch-making work embodied in the first edition of Ehrlich's and Lazarus's Anemia, issued over ten years ago. During this interval many changes have taken place in our conception of the morphology of the blood, but in their essentials the principles first enunciated by Ehrlich still hold good. In this second edition, which is really an entirely new book, Ehrlich himself has taken no active part; but the work has been divided between two of the leading exponents of his school: Lazarus having undertaken the normal and pathological morphology of the red corpuscles and Naegeli that of the white. The subject does not admit of a detailed review; suffice it to say that the book occupies a place in the front rank of works on hematology. The translation is adequate and the plates peculiarly beautiful.

GYNECOLOGIE OPERATOIRE, par Henry Hartmann, Professeur de Médecine opératoire à la Faculté de Médecine. Avec 422 figures dans le texte dont 80 en couleur. Paris: G. Steinheil. 1911. Price, 18 fr.

A careful examination of this interesting volume must convince the reader of the noteworthy fact that no really new method of operation for gynecological anomalies has been advanced very recently, and that the routine operations employed by the gynecologists the world over have become almost—if this expression is permissible—standardized. We see the same descriptions, the same illustrations elucidating the typical plastic operations, or abdominal and vaginal hysterectomies, of course, varying to a certain extent in comprehensiveness and clearness; and it may be said, that in this new French work both text and illus-

trations are of unusual exactness. Nevertheless, it must be admitted that the careful perusal of such a volume written by a distinguished foreigner cannot fail to be of interest and value to the American gynecologist and surgeon in that it reveals innumerable finer points in the technique, in diagnosis, and in the indications for operation, and also conveys a clearer idea of the writer's opinion concerning the comparative value of conservative and operative procedures in certain affections. In this last mentioned aspect the difference of opinion between American and European gynecologists is very obvious.

ATLAS OF MICROSCOPIC DIAGNOSIS IN GYNECOLOGY—With Preface and Explanatory Text. By Dr. Rudolf Jolly, Priv. Doc. Chief Physician of the Gynecologic Clinic, University of Berlin. Only authorized English translation. By P. W. Shedd, M. D. New York. With 52 Lithographs in Color and 2 Textual Figures. New York: Rebman Company. Price, \$5.50.

This translation makes accessible to the English-speaking physician the most valuable atlas of gynecological histology ever published. Fifty-two colored lithographs almost completely represent all the histological pictures seen in the examination of scrapings removed from the uterus for diagnostic or therapeutic purposes. The short text points out the characteristic features of each section and the essential differences from similar histological pictures offered by other diseases. These lithographs are drawn with such exactness that the experienced will hardly find any difficulty in diagnosing the disease which each represents.

UEBER ANAPHYLAXIE (UEBEREMPFINDLICHKEIT) IN LICHT MODERNER EIWEISS-CHEMISCHER BETRACHTUNGSWEISEN. Von Privatdozent Dr. Wolfgang Weichardt, Erlangen. Wuerzburger Abhandlungen aus dem Gesamtgebiet der praktischen Medizin. xi Band. 1 Heft. Wuerzburg: Curt-Kabitzsch (A. Stuber's Verlag). 1910. Price, M.—85.

In this monograph on anaphylaxis, Dr. Weichardt first reviews our present knowledge of the subject in the light of the recent literature, and then discusses in somewhat greater detail his own considerable contributions to the subject. A perusal of the pamphlet, which does not exceed 19 pages, will serve to give the reader a clear notion of our present knowledge in this difficult and involved field. We note with pleasure that full credit is given throughout to the work of Americans.

LES GREFFES OVARIENNES. Envisagées au point de vue de la pratique chirurgicale. Par le Dr. Louis Sauve. Paris: G. Steinheil.

This thesis, published from the clinic of Professor Quénu, gives a detailed account of all the investigations and observations, including those of the writer himself, concerning ovarian transplantation. Sauve, in this little brochure, takes particular care to define the practical value of this operation and discusses *in extenso* the results so far obtained.

TRANSACTIONS OF THE FOURTH INTERNATIONAL SANITARY CONFERENCE OF THE AMERICAN REPUBLICS. Held in San Jose, Costa Rica, December 25, 1909 to January 3, 1910. Published and Distributed Under the Auspices of the Pan-American Union. John Barrett, Director-General, Washington, D. C. 1910.

As the title indicates, this is an account of the papers, committee reports, discussions and other doings of the Fourth Pan-American Sanitary Conference. Much valuable material is buried in the volume, but rendered quite inaccessible to the ordinary reader, by the total absence of any index.

THE PHYSICIAN'S VISITING LIST FOR 1911. Sixtieth Year of its Publication. Philadelphia: P. Blakiston's Son & Co.

A convenient pocket visiting list, with the usual tables and data, not differing essentially from others of its class.

BOOKS RECEIVED.

THE CANCER PROBLEM—A Statistical Study. By C. E. Green, F. R. S. E. Edinburgh: William Green & Sons. 1911.

THE CARE AND TRAINING OF CHILDREN. By Le Grand Kerr, M. D. New York: Funk & Wagnalls Company. Cloth, 75 cents. 1910.

SOMEBODY'S LITTLE GIRL. By Martha Young. Illustrated by Ida Dougherty. New York: Hinds, Noble & Eldredge. Price, 50 cents.

THE INTERNATIONAL MEDICAL ANNUAL. A Year Book of Treatment and Practitioner's Index. New York: E. B. Treat & Co. 1911. Price, \$3.50.

DIE PRAKTISCHE BEDEUTUNG DES SALVARSAN FUER DIE SYPHILISTHERAPIE. By Dr. S. Jessner, Sanitätsrat. Würzburg: Curt Kabitzsch (A. Stuber's Verlag). 1911. Price, Mk. 1.80.

LE CANCER. By Docteur Joseph Thomas. Deuxième Edition Revue et Augmentée. Preface du Professeur Albert Robin. Membre de l'Académie de Médecine. Paris: A. Maloine. 1910.

MAKERS OF MAN—A Study of Human Initiative. By Charles J. Whitby, M. D. (Cantab.) With Forty-Seven Half-Tone and Other Plates. New York: Rebman Company. Price, \$3.00.

COLLECTED PAPERS BY THE STAFF OF ST. MARY'S HOSPITAL, Mayo Clinic, Rochester, Minnesota, 1905-1909. Octavo of 668 pages, illustrated. Philadelphia and London: W. B. Saunders Company. 1911. Price, \$5.50.

LOVE AND MARRIAGE. By Ellen Key, Author of "The Century of the Child," etc. Translated from the Swedish by Arthur D. Chater, with a critical and biographical introduction by Havelock Ellis. New York: G. P. Putnam's Sons. 1911. Price, \$1.50.

NEW AND NON-OFFICIAL REMEDIES, 1911. Containing Descriptions of the Articles which have been Accepted by the Council on Pharmacy and Chemistry of the American Medical Association, Prior to January 1, 1911. Chicago: Press of the American Medical Association. 1911. Price, paper 25c, cloth 50c.

LANDMARKS AND SURFACE MARKINGS OF THE HUMAN BODY. By L. Bathe Rawling, M. B., B. C. (Cant.), F. R. C. S. (Eng.) Surgeon With Charge of Out-Patients, Demonstrator of Practical and Operative Surgery. With Thirty-One Illustrations. Fourth Edition. New York: Paul B. Hoeber. Price, \$2.00. 1911.

SYPHILIS: ITS DIAGNOSIS AND TREATMENT. By F. J. Lambkin, Col. R. A. M. C., Lecturer on Syphilology, Royal Army Medical College, London, Late

Specialist at the Army Headquarters, India, etc. Preface by Sir Frederick Treves, Bart., G. C. V. O., C. B., L.L.D. New York: William Wood & Co. 1911. Price, \$2.25.

ENLARGEMENT OF THE PROSTATE. Its Treatment and Radical Cure. By C. Mansell Moullin, M. D. Oxon., F. R. C. S., Vice-President of the Royal College of Surgeons, Consulting Surgeon to the London Hospital, Hunterian Professor at the Royal College of Surgeons, etc. Fourth Edition. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$1.75.

THE WASSERMANN SERO-DIAGNOSIS OF SYPHILIS IN ITS APPLICATION TO PSYCHIATRY. By Dr. Felix Plaut, Scientific Assistant in the Psychiatric Clinic of the University of Munich. Authorized translation by Smith Ely Jelliffe, M. D., Ph.D., and Louis Casamajor, A. M., M. D. New York: The Journal of Nervous and Mental Disease Publishing Co. 1911.

HANDBOOK OF DISEASES OF THE EYE. A Textbook for Students and Practitioners. By Harry Caldwell Parker, M. D., Clinical Professor of Ophthalmology, Indiana University School of Medicine, Indianapolis, Indiana, etc. Illustrated with 115 text engravings, a half-tone frontispiece and 5 full-page chromolithographic plates, with 26 figures. Philadelphia: F. A. Davis Co. 1910. Price, \$2.00.

A HANDBOOK OF PRACTICAL TREATMENT. By Many Writers. Edited by John H. Musser, M. D., LL.D., Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia, and A. O. J. Kelly, A. M., M. D., Assistant Professor of Medicine in the University of Pennsylvania, Philadelphia. Volume 11. Philadelphia: W. B. Saunders Company. 1911. Price, cloth, \$6.00; half morocco, \$7.50.

WHAT SHALL I EAT? A Manual of Rational Feeding. By Dr. F. X. Gouraud, Formerly Chief of the Laboratory of the Medical Faculty of Paris. With a preface by Prof. Armand Gautier, of Paris. Only authorized translation into the English language by Francis J. Rebman. With a glossary containing definitions of the principal technical terms, and an index of diseases referred to in the text. New York: Rebman Company.

DISEASES OF THE STOMACH AND INTESTINES. By Boardman Reed, M. D., Member of the American Medical Association, Consulting Gastro-Enterologist to the Pottenger Sanatorium, Monrovia, Cal., Late Professor of Diseases of the Gastro-Intestinal Tract, Hygiene and Climatology in the Department of Medicine of Temple University, etc. Illustrated. Third Edition, thoroughly revised and largely rewritten. New York: E. B. Treat & Co. 1911. Price, \$5.00.

A TREATISE ON DISEASES OF THE EYE. By John Elmer Weeks, M. D., Professor of Ophthalmology in the University and Bellevue Hospital Medical College (Medical Department of New York University); Surgeon to the New York Eye and Ear Infirmary; Member of the American Ophthalmological Society; Honorary Member of the Royal Hungarian Medical Society of Budapest, etc. With 528 engravings and 25 full-page plates in colors. Philadelphia: Lea & Febiger. 1910.

A MANUAL OF PRACTICAL INORGANIC CHEMISTRY. Including Preparations and Qualitative and Quantitative Analysis with the Rudiments of Gas Analysis. Specially adapted to cover preliminary and intermediate university courses and the first three stages of the syllabus of the Board of Education. By A. M. Kellas, B.Sc. (Lond.), Ph. D. (Heidelberg), Lecturer on Chemistry at the Middlesex Hospital Medical School, formerly Examiner in Chemistry

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The range of application of this remedy in derangements of the female reproductive organs, is in those conditions characterized by nervous irritation, spasm and pain, and hence it is indicated in ovaritis, ovarian neuralgia, functional dysmenorrhea and in nervous manifestations and restlessness occurring during pregnancy.

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to the Conjoint Board of the Royal Colleges of Physicians and Surgeons.
New York: Oxford University Press. 1910.

CHOLERA AND ITS TREATMENT. By Leonard Rogers, M. D., F. R. C. P., F. R. C. S., B. S., I. M. S. Physician, Cholera Wards, Medical College Hospital, Calcutta Professor of Pathology, Medical College, Calcutta; Fellow of the Calcutta University; Fellow of the Asiatic Society of Bengal; Corresponding Member of the Philippines Medical Society, The American Society of Tropical Medicine; The American Climatological Association and the Société de Pathologie Exotique; Mary Kingsley Medallist for Research in Tropical Medicine. New York: Oxford University Press. 1911.

HYGIENE AND PUBLIC HEALTH. By Louis C. Parkes, M. D., D. P. H., Univ. of Lond., Consulting Sanitary Adviser to H. M. Office of Works; Examiner in Public Health to the Royal Colleges of Physicians and Surgeons, London; Fellow of the Royal Sanitary Institute; and Henry R. Kenwood, M. B., F. R. S. Edin., D. P. H. Lond., Chadwick Professor of Hygiene in the University of London; Examiner in Public Health to the Royal Colleges of Physicians and Surgeons, London; Fellow of the Royal Sanitary Institute. Fourth Edition, with illustrations. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$3.50.

THE MARVELS BEYOND SCIENCE—Being a Record of Progress Made in the Reduction of Occult Phenomena to a Scientific Basis. By Joseph Grasset, M. D., Professor of Clinical Medicine at the University of Montpellier, and National Fellow of the French Academy of Medicine; Author of "The Semi-Insane and the Semi-Responsible." With a Preface by Emile Faguet of the French Academy. Authorized English Translation of the Second Revised and Enlarged French Edition. By René Jacques Tubeuf. Fellow of the University of Paris. New York: Funk & Wagnalls Co. 1910. Price, \$1.75.

A HANDBOOK OF OBSTETRIC NURSING—For Nurses, Students and Mothers. Comprising the Course of Instruction in Obstetric Nursing Given to the Pupils of the Training School for Nurses Connected With the Woman's Hospital of Philadelphia. By Anna M. Fullerton, M. D., Formerly Obstetrician, Gynecologist, and Surgeon to the Woman's Hospital of Philadelphia, Physician-in-Charge and Superintendent of its Nurse School; and Clinical Professor of Gynecology in the Woman's Medical College of Pennsylvania. Seventh Revised Edition. Illustrated. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$1.00.

INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene, and Other Topics of Interest to Students and Practitioners. By Leading Members of the Medical Profession Throughout the World. Edited by Henry W. Cattell, A. M., M. D., Philadelphia, U. S. A. Volume 1. Twenty-first Series. 1911. Philadelphia and London: J. B. Lippincott Company. Price, \$2.00.

THE TREATMENT OF SYPHILIS WITH SALVARSAN. By Dr. Wilhelm Wechsellmann, of Berlin, Medical Director of the Skin and Venereal Disease Section, Rudolph Virchow Hospital, Berlin. With an Introduction by Professor Dr. Paul Ehrlich, of Frankfurt-on-Main, Director of the Royal Institute for Experimental Therapeutics, Frankfurt. Only Authorized Translation. By Abr. L. Wolbarst, M. D., of New York. Consulting Genito-Urinary Surgeon, Central Islip State Hospital; Visiting Genito-Urinary Surgeon, People's Hospital; Professor of Genito-Urinary Diseases, New York School of Clinical Medicine, etc. With 15 Textual Figures and 16 Colored Illustrations. New York: Rebman Company. Price, cloth, \$5.00.

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EDITORIAL.

THE CLEVERNESS OF MR. ARNOLD BENNETT.

It happens, every now and then, that a literary man with no affiliations with medicine writes so well and instructively on subjects that have been clumsily handled by medical men, that we are safe in allowing ourselves to be guided by him in the maze of doubts and questionings, which the superficiality of the age has dubbed "modern life." Now, if the truth were fully stated, those searching questions would be found to be of a ripe old age, if not of an antiquity that dates back many centuries; for every period in the upbuilding of our civilization has had to contend with what it was pleased to call "the modern spirit that takes but small account of life." Why the modern spirit should be a bugbear to the conservatives in a community needs no further explanation here other than the statement that to them anything that breathes, even the slightest degree of progress, is viewed with misgivings; but conjoined with these are many others who, while their interests lie in the line of progress, are nevertheless at times reminded, by the small voice which is supposed to represent their conscience, that perhaps in dedicating their lives to the spirit of modernity they are living the life that must surely end in a wreckage of nerves and a disheartening deterioration of a number of their internal organs. These ideas have been dwelt upon in detail in all our medical journals, and while the advice in some instances has been excellent, in others—and now we mean the great majority—there has been that absence of largeness of view and kindly philosophy without which all writings lose in effectiveness. Hence, it is with gratitude that we regard Mr. Arnold Bennett's lately published books, "How to Live on 24 Hours a Day" and "The Human Machine."

Imprimis, it would be well to remark that Mr. Bennett is not an opponent of the modern spirit as it has influenced life at the present day, but an ardent admirer, inasmuch as his attitude is one of non-belligerent acceptance of the social conditions as they are. To meet these in a frame of mind that shall be productive of good for others, he has devised a simple philosophy which it would be well for all medical men to read and re-read until they know every word of it by rote. And in its simplicity lies its appeal, as well as in its rationalism: two qualities, we take it, which, though looked at askance by those who delight in burdening their minds with complicated theories and thought-destroying technicalities, have a high value if the desire is to arrive at some goal on the broad highway of clear thought.

By reducing the human organism to what superlative critics might deem a degrading level—namely, a machine, Mr. Bennett, already on the first page of "The Human Machine," illustrates that his mind has enough practicalness to make his definition fit in with this matter-of-fact age. Physicians in recent times have been influenced to no inappreciable degree by the teachings of expositors of the mind in all its ramifications, and the result has been that a cult has been set up in the province of medicine that has relegated to a secondary place the lesser physiology of the body. Mr. Bennett, while not an adept in physiology, is fully aware that the mechanism of the body is on lines similar to those of any other piece of machinery, and that its proper working capacity can only be maintained when a sanity, that is capable of meeting all emergencies, is ready to hand to combat vagaries that act as clogs. This is the fundamental idea of both books, and as such is worthy of more than passing notice; for though we may say that the idea of comparing the human organism to a piece of machinery is trite, the elaboration of it as written by Mr. Bennett must be admitted as new, since it cannot fail to bring home to all physicians the realization of their own flounderings in their futile attempts to direct mankind towards health.

THE DICKENS STAMP.

Those physicians who concern themselves with centenaries should pay particular attention to the one-hundredth anniversary of Dickens' birth, which will take place next year, for the stamps which will be sold will serve a twofold purpose—namely, the proceeds will be devoted to a good cause—the support of the author's grandchildren—and the stamps themselves will be decorative enough to enhance the value of the works

of Charles Dickens, which we take for granted every well-read physician has in his library. It has been remarked more than once in certain medical quarters, that Dickens was no friend of the medical profession, that his characterizations of medical men and nurses are such decided caricatures that truth is absolutely scorned, that humor should be condemned that can only find its best play in exaggeration. While all this cannot be denied, the fact must not be overlooked that humor, no matter how wide of the truth it is, never has the sting of satire, and on account of an inherent kindliness brings forth a laugh even when our Achilles heels are touched none too lightly. Dickens, with his unquenchable humor, is in this respect a much better literary companion than Thackeray, for where the latter makes us smart under his mordant blows, the former merely makes us cognizant of our foibles and teaches us how ridiculous they are. Such correction of our failings should be most welcome, for from so wholesome a lesson must come beneficial results; and if to-day there are those in the ranks of medicine, who take umbrage at what this extraordinarily gifted man said about certain defects which will always be more or less linked to the practice of medicine, so long as human nature is not perfect, more's the pity that the sense of humor should be so limited.

But it is not our intention here to argue for or against Dickens' conception of the physicians of his day, nor the nurses and medical students who came within his ken. But what should be remembered, and not in malice, is the keenness of his eye that detected those very flaws in our social science which to-day, that is some sixty-nine years after the publication of "American Notes" and "Martin Chuzzlewit," are being inveighed against by physicians as menaces against the health of the American nation. Our forefathers, it will be remembered by all those who have followed literary criticism in this country, were highly incensed when this keen eye dwelt in "Martin Chuzzlewit" on the barbaric noises which greeted Martin on his arrival in New York,—noises which, just as to-day in all our American cities, emanated from ubiquitous newsboys to add to the general turmoil,—and for which only very recently a society has been organized in New York for the suppression of city noises, and when, as in "American Notes," there was drastic criticism of the common drinking cup, the habit of expectorating which at times amounted to a deluge, the jack-towel still seen in the lavatories of our best restaurants, and the public comb and hair-brush which were "hanging up before a little looking-glass in the bar, in the immediate vicinity of the bread and cheese and biscuits." Of course, we of to-day have only pity for the shortsightedness of our easy-going forebears who thought

altogether too lightly of the despicable habit of spitting where'er they willed, of the common drinking cup, the public hair-brush, and the common tooth-brush! But have we realized all these reforms? and, if we have, why do we continue to put up in our street-cars such signs as "Gentlemen are requested not to spit on the floor," which is certainly a rare bit of unconscious humor.

When a critic is so acute and withal so kindly as was Dickens, there should be no reason why, when the opportunity presents itself, the medical men of this country should not join with other admirers in showing their appreciation of genius. It does not happen any too often that, after many years, criticisms which once were bitterly fought come true: and since what Dickens once wrote about us, and which was condemned, is now the prime mover in the war which medical men are waging against certain deplorable lacunæ in our civilization, is it not fit for us to recognize his prescience in proper form? But even if this English master of the novel had failed to see our defects, his compositions should make strong appeal, since no physician, wearied after his day's work, can get a better tonic for his nerves than a perusal of pages that declare the imperishableness of the gift of humor.

THE AUTOMOBILE AND THE SEXUAL POWERS.

The criticisms, which have hitherto been visited on the automobile, have been of such a nature that but scant attention was paid them, for what did the enthusiastic chauffeur care whether he was the carrier of germs to the bedside of a patient, or whether in the course of years the contour of his face would betray that too much concentration on the guiding of his car had resulted in a new cast of countenance. But an altogether different phase is put upon the matter by an article in the *Zeitschrift fuer Urologie* (Vol. V., No. 4), in which Professor von Notthafft shows that impotence is the price paid by all chauffeurs, be they medical or otherwise, who are never in a happy frame of mind unless they are driving their cars at top-speed. To substantiate his theory that the nervous system of the chauffeur is severely "damaged," Professor von Notthafft cites five cases which illustrate, beyond a doubt, that the sexual organs suffer in no mistakable fashion from the upset which results from concentration and fear of accident on the part of the chauffeur. The impotence in the Professor's cases was only of temporary duration, though at a certain stage in the treatment the outlook was far

from promising, inasmuch as yohimbin and faradization had failed to bring about good results. Then the possibility of the nefarious work of the automobile occurred to this ingenious investigator; and that his mental attitude was not one of prejudice against the automobile was proved by the complete restoration to sexual prowess of all his patients shortly after they ceased driving their cars. And to prove his contention, so that no critic can arise to show that it is not faultless, Professor von Notthafft gravely adds that those who merely ride in automobiles are not similarly affected, since their sexual powers are considerably increased!

Now, if what is so graphically described by the writer is true, we have at least a partial solution of the vexed question as to why the population in most countries is decreasing. Statisticians have delved deep into this subject with a patience that should halo their heads; but though they have dwelt most alluringly on the subject of the high price of commodities and the unwillingness of families to be burdened with more than one child, as the only reasons for the decrease, their cleverness at finding out the real cause must be called into question. If they really were aware of the cause, as has just been told us by the German professor, they should not have withheld their knowledge from us; for by being the opposite of candid they have allowed nations to diminish in numbers, when by placing an embargo on speed-mania, not only could they have prevented national deterioration, but they could have added to the world's happiness by a ready solution that would have stopped the avalanche of reasons, which has latterly inundated us. For there is France, with a population that is fast dwindling to small proportions, if we are to believe the vital statistics just published in the *Journal Officiel*, and which proclaimed that in 1910 the excess of births over deaths was only 70,581, as compared with 84,061 in the previous year. As is well known, in no country in the world is speed-mania so prevalent as in France; hence, Dr. Bertillon, who has been working for years most assiduously on the subject of why his unhappy country is still cursed with a diminishing birth-rate, and who is no nearer a solution than he was when he began his investigations, should not think too lightly of Professor von Notthafft's timely warning. To save a nation has never been effected save by martyrdom, but in this case the process cannot possibly inflict on the reformer any such inconvenience to life.

THE AVERAGE MEDICAL INCOME.

It would appear from the number of articles which have recently been printed on the subject of the average medical income, that statisticians are really entertaining serious thoughts in regard to a matter that presumably a false sense of pride has withheld altogether too long from a medical public that has known none too well the real facts in the case. But now that the smallness of the average medical income has been laid bare in the arena of our medical journals, the unwelcome truth can no longer be denied; and though in the future the average practitioner may hope to presume upon our credulity by assertions that glitter to the point of causing blindness, the weapons which we hold, thanks to the statisticians, will not fail to destroy his high-flown remarks about money flowing into his coffers. Thus we see that the enlightenment, which has been granted us through the labors of those who seek the truth, is such that it cannot but be a great help in bringing to book all those practitioners, who have been in the habit of flaunting their success before our envious eyes without the slightest demur on our part.

When the statisticians fixed on the sum of one thousand dollars as the average medical income, were they really good accountants, or merely croakers who saw that the medical times were out of joint? Though not in a position to answer either question satisfactorily, we yet feel that their main object was to quash all false ideas, which somehow grow too luxuriantly in the minds of recent graduates in medicine as to the ease with which the medical Eldorado may be captured. Thus, if it cannot be controverted that one thousand is the average income, the pioneer work, which these statisticians have done in ridding our budding physicians of all illusions, must rank with the best humanitarian undertakings of the age, for can it be denied that when one is fully prepared for the worst, strength of character is not protected? And surely a more than usual amount of will-power is necessary, if smiles are to take the place of sighs, when after years of patient waiting the average medical income remains the same with a persistence that is maddening, to say the least. To soothe the life of another fellow-man in the ranks of medicine is indeed a noble act, and until now thought an exceedingly difficult one; but armed as we are with statistics, how easy the task will be to convince him that as an average man he cannot possibly hope for more than an average income, though the price of the necessities of life is continually soaring skywards.

OPINION AND CRITICISM.

X-RAY NOMENCLATURE.

It would seem that the universal use of a physical agent for fifteen years would have provided a nomenclature, established by usage, warranted by euphony and exercised by general consent.

To William Conrad Roentgen all honor is due for a correlation of physical elements and a fortuitous foresight into unknown phenomena. There is good reason that his name should be indelibly impressed upon the subsequent history of his experiments. But there are also the claims of others to be considered and the necessity of striking a compromise as to a nomenclature of universal availability.

At the present time, the word "roentgen" is synonymous, in Germany and Austria, with the term "*x-ray*," "roentgenstrahlen," "roentgen laboratorium," and "roentgenization." In England, the term "*x-ray*" is more generally in use. In America, we indifferently apply the term and the word. That the German should promote the use of a name of international fame is characteristic of Germany and none the less commendable. That England should promote the use of the name "*x-ray*" is also worthy of attention. It was only by the use of the Crookes tube that the development of Roentgen's experiments proved valuable. The humble name *x-ray*, as used first by Roentgen himself, provides a characteristic appellation which, on account of its brevity and the ease with which it is written, should suffice for all nations.

We find that the coil of Ruhmkorff, the tube of Crookes and the mind-process of Roentgen have combined to place an invaluable agent at the service of mankind. The very nature of the gift to the world precludes the selfish use of a proper name to indicate the agent. As well use the proper names Bell or Morse to point out other beneficent inventions.

Some years ago, the American Roentgen Ray Society decided to promote the nomenclature as expounded by the Deutsche Roentgen Gesellschaft. This was no doubt fostered by the knowledge of the deep debt that the world owes to the experimental *x-ray* research of the German laboratories. But this would load our language with polysyllables which are more or less ridiculous in the English language.

It would therefore appear that the short, crisp name, *x-ray*, as used by Roentgen himself, would afford the happiest compromise irrespective of the nationality of the writer.

LITERARY NOTES.

No doubt by this time, every physician, who follows current matters with some degree of interest, has read about the epoch-making exhibits in New York and Chicago illustrative of the needs of the modern child. The Child Welfare Exhibit must bring home to all members of the medical profession the thought that hitherto, on account of our rather hysterical pursuit of diseases, we have really overlooked the fact that the child is father of the man, and that if we continue to withhold from it those things which make for its health and comfort we are not working at all in the interests of the community. We are not in a position to posit that Ellen Key, whose recently published book "Love and Marriage" has come to our desk, was the instigator of this movement, but what we can assert in all reason is that no one living to-day has taken a greater interest in the welfare of the child. Whether we read her "Century of the Child" or the book which has just been mentioned, the thought we gather is that here is a student of child-life whose every utterance carries weight. Ellen Key is no physician; hence, it would be futile to consult her about those phases of a child's life which most interest members of the medical profession, but within her limitations she evidences a psychology that shows the thinker who is not content to wander along the beaten paths. And it is well at all times to have among us both men and women who can think in their own individualistic way, even though out of this may arise several jolts to our supineness, which are far from being enjoyable. This Swedish woman is not afraid to write the truth as she sees it, in large fat letters, so that even the myopic cannot have the excuse that her messages cannot be read; and, though her attitude is to-day considered unconventional to the degree of daring, we feel that when a greater knowledge of the needs of the child is understood a more kindly criticism will be meted out to her.

In connection with the centenary of the King of Rome, M. Welschinger has recently published in the *Journal des Débats* some interesting anecdotes in regard to the accouchement of Marie Louise and the advice given by Corvisart, who was in attendance at that time. After the confinement which, by the way, caused considerable excitement not only on the part of Corvisart, but also on the part of Napoleon, by reason of its tediousness, Corvisart took Napoleon aside and told him that another crisis such as this in Marie Louise's life would surely end in death. Of course, words such as these coming from so eminent a medical man as was Corvisart could not but make an indelible impression on Napoleon; and though he might have forgotten the sinister words of warning had

Marie Louise's social status been that of Josephine, who was neither a king's nor an emperor's daughter, as regards Marie Louise it was an altogether different matter, for was she not the daughter of Emperor Francis I. of Austria, and was he not a mere bourgeois who was even then, despite his title, called by all royal families of Europe a vulgar upstart? And thus Napoleon did not forget the weighty words of Corvisart. But, as a prognosticator, Corvisart was even a greater failure than as an accoucheur of sound judgment and steady nerves, for when Marie Louise "married" Count Neipperg she bore him three children, and no Austrian accoucheur became panic-stricken lest the life of so valued a member of royalty should be eclipsed in childbirth.

Those physicians among us, who like Silas Wegg have a weakness for "dropping into poetry" in their leisure moments, should not fail to read Professor Ronald Ross's book of poems entitled "Philosophies," of which John Murray of London is the publisher. For by making an intelligent study of it, they must soon realize that the gift of poetry is not at all germane to science, even though the mental attainments, as in the case of Professor Ross, be far above the ordinary. Now, if our medical poetasters will but remember this, much will be gained, and no longer will a long-enduring and long-suffering public be called upon repeatedly to subject, with a good grace, its patience to the perusal of puerile poetical attempts which should have remained unborn. Professor Ross naïvely states in his preface that "friends who have read that part of them which is called "In Exile" complained that they could not easily follow the movement of it," and we may add that if "friends" were so completely in the dark, there is surely justification for our mental obscuration. It is said that after reading Browning's "Sordello," Mrs. Carlyle wished to know whether Sordello was a man, or a city, or a book; and the same thought occurs to us upon perusing with considerable patience line after line in this book. In exile in India is not a lot to be envied, as Kipling has so well told us in his unforgettable poem, "Christmas in India"; but though the plight of the banished one is bad enough, it is as nothing compared with our own when duty compels us to read the poems of those physicians and scientists who cannot withstand the lure of "dropping into poetry."

Among the books of travel, which have recently been published, none to our mind is more interesting than the collection of letters which appeared in the *Boston Medical and Surgical Journal* over the name of

"Medicus Peregrinus," and are now issued in book form as "Litora Aliena" by W. M. Leonard of Boston. These letters breathe a freshness and originality which must commend them to all readers who are somewhat jaded by the repetitious performances so often put forth in print as new interpretations of travel. Whether "Medicus Peregrinus" takes us to Lichfield and discourses about Dr. Johnson, or to London and walks us through the hospitals, the interest is the same, since his mind is ever on the alert for what will interest the reader of wide latitude. And there is just enough of medicine in the book not to frighten the general reader, or to weary the medical one as by a twice-told tale. In fact, what appeals to us most is the author's literary and historical enthusiasms and the cleverness of his many observations. Added to these the buoyancy of his style is never a negligible quality; and this surely is an asset when reading about places which otherwise might not interest the reader for long.

ORIGINAL ARTICLES.

RECENT STUDIES UPON THE ELECTROCARDIOGRAM AND UPON THE CHANGES IN THE VOLUME OF THE HEART.

By ARTHUR D. HIRSCHFELDER, M. D., of Baltimore,
Associate in Medicine, Johns Hopkins University.

PART I.

THE ORIGIN AND COURSE OF THE CARDIAC IMPULSE AS REVEALED BY PHYSIOLOGICAL AND CLINICAL STUDIES, ESPECIALLY THOSE WITH THE ELECTROCARDIOGRAM.

New methods lead to the discovery of new facts, new facts to new doctrines, new doctrines to new lines of treatment.

The more recent conceptions, regarding the origin and course of the normal and pathological impulse in the heart, have been the direct result of the introduction of two new methods for studying them in man; namely, the venous pulse and the electrocardiogram.

The study of the curve obtained by recording the wave of pulsation over the jugular vein had been in vogue since the studies of Friedreich and Marey in the middle of the last century, but did not attain practical importance until James Mackenzie in 1893 began to record the curves over the jugular vein and that over the carotid artery, simultaneously. The first wave in the jugular pulse revealed the contraction of the auricle; the carotid wave revealed the contraction of the ventricle, and a comparison of the sequence of the two enabled Mackenzie to interpret the sequence of the cardiac chambers in the normal and the irregular hearts of his patients. The use of this method enabled Mackenzie¹ to study the arrhythmias of his patients' hearts in the light of Engelmann's studies upon experimental irregularities in the frogs' hearts, and the use of the same method enabled W. His, Jr., in 1899, to demonstrate the dissociation between contractions of the auricles and ventricles in a patient suffering from Adams-Stokes disease, and to interpret it in the light of Gaskell's studies upon the frog's heart. These studies with their experimental confirmations by Hering, Erlanger and a host of others, formed the basis of the modern conceptions of cardiac pathology.

However, it soon became apparent that great as were the advances due to the phlebogram, the method had its limitations, for it was im-

possible to determine in which auricle or in which ventricle a disturbance of rhythm arose, and in order to obtain new light upon these points another method had to be devised.

The method which promises most from this standpoint is the study of the electrical variations accompanying the cardiac contraction, or the electrocardiogram.

The study of the electrocardiogram in man was not new to physiologists, since it was made with the capillary electrometer by Ludwig and his pupil, Waller² in 1887, and revived by Einthoven³ of Leyden in 1895; but the electrical variations which are from 1/10,000 to 1/3,000 of a volt were too slight to be indicated by this means. However, in 1906 Ein-

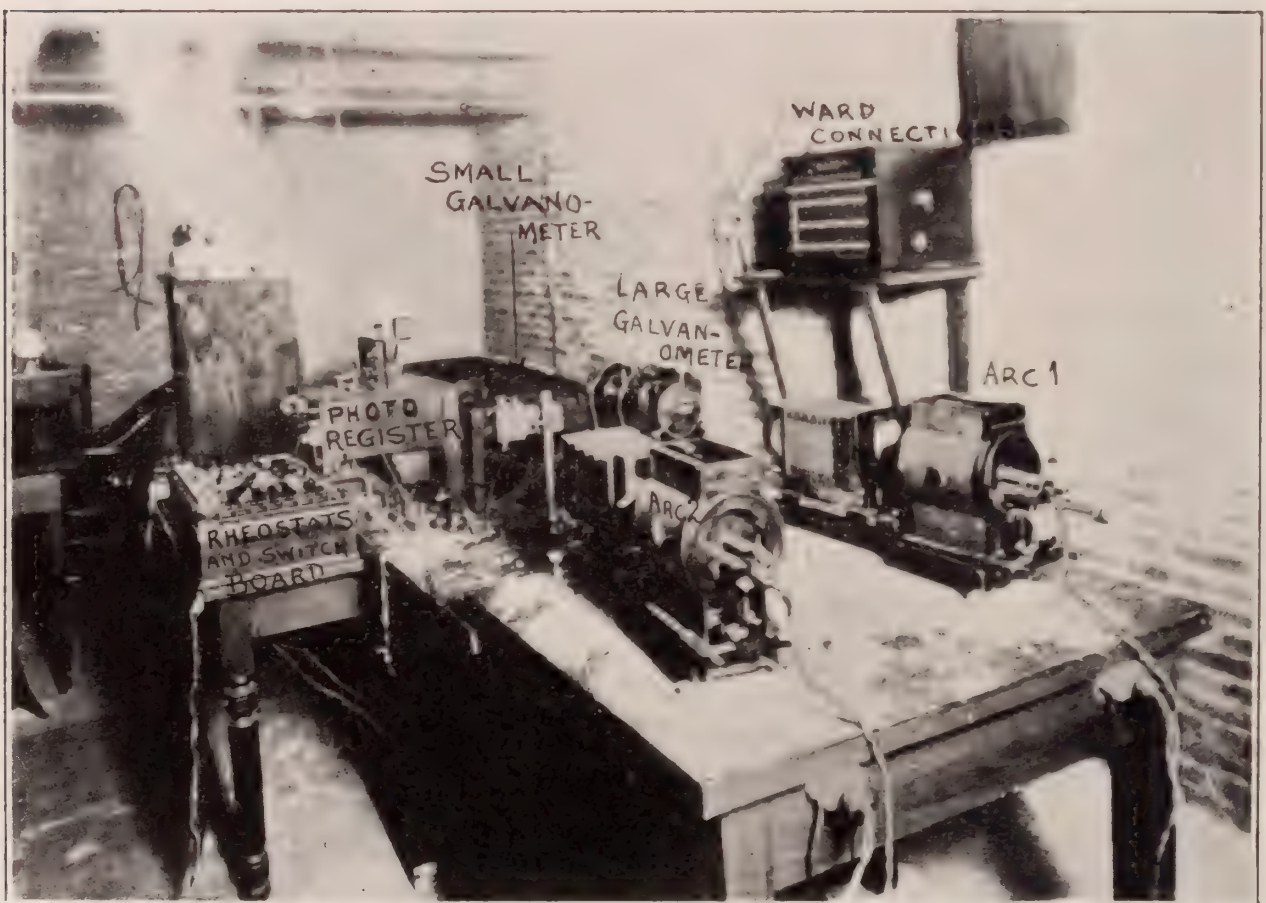


Fig. 1.—Photograph of the electrocardiograph installed at the Johns Hopkins Hospital.

thoven invented a new type of galvanometer, now known as the string galvanometer or thread galvanometer, whose delicacy was sufficient for the purpose (Fig. 1). This galvanometer depends upon the well-known fact that a current generates a magnetic field acting at right angles to its course, which varies with the strength of the current, and which may thus exert a varying attraction or repulsion upon a second magnetic field in its vicinity.

The current from the body, which is thus varying in intensity, is carried upon a quartz or platinum filament about $3\ \mu$ (.003 mm.) thick, which is so light that its weight is negligible, for it cannot be weighed with

the most delicate balances. It is suspended between the poles of a very powerful electro-magnet with large cast-iron armatures. The movements of the thread are recorded by projecting its shadow under the magnification of a high-power microscope upon the slit of a specially devised camera, about six feet away. The film of this camera moves rapidly past the slit, and the oscillations of the thread are recorded as a curve. The time is indicated by the shadow of a time marker placed in front of the slit.

The current is led off from the body from German silver electrodes which are padded with felt soaked in physiological salt solution (Fig. 2 +, —). The current thus obtained represents the difference of potential between the skin under two electrodes, and is generated by two

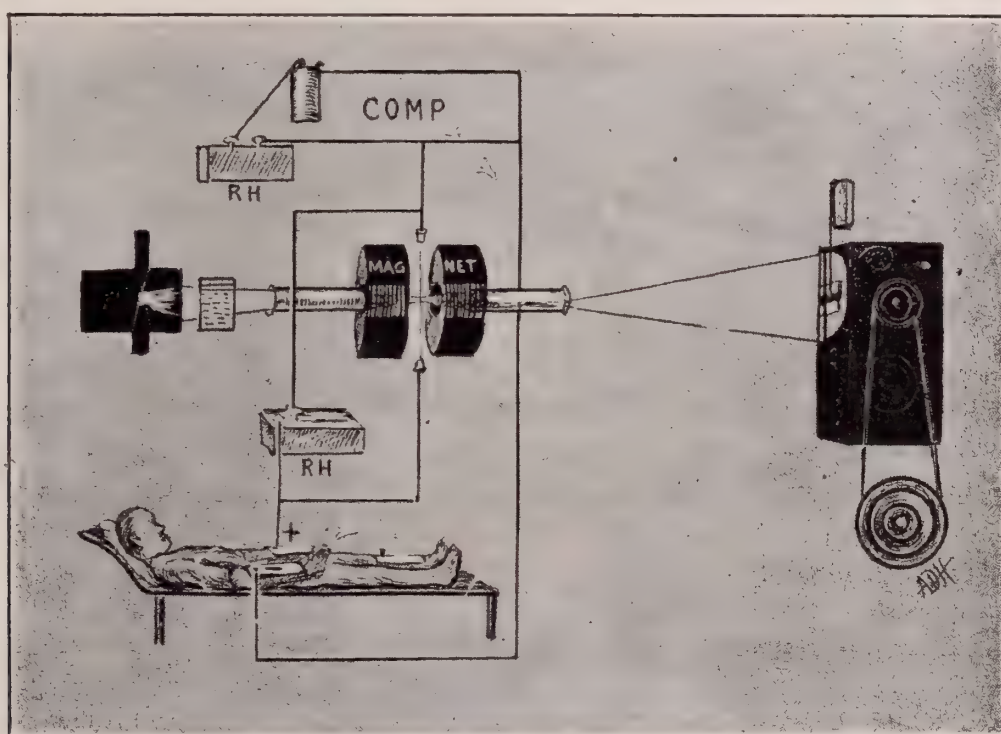


Fig. 2.—Diagram showing the simplest arrangement of the connections for the electrocardiograph. RH, Rheostat; COMP, compensating current.

elements: 1. The permanent difference of potential between these two different parts of the body, which is dependent upon local conditions of the skin and tissues and is quite independent of the cardiac cycle. This is known as the current of rest. 2. The oscillations due to the action current of the heart itself, the electrocardiogram proper. Since we are interested only in the latter, the *current of rest* is neutralized by passing through the galvanometer a battery current exactly equal to it, but opposite in direction. After which compensation the only current acting upon the galvanometer is that which accompanies the contraction of muscles. When the patient is quiet, the tonic contractions of the skeletal muscles play but a little rôle, and the action-current that is observed is seen to accompany cardiac contractions (Fig. 3). Contraction of the hand or foot muscles exerts a definite effect, which is much slower

than the cardiac impulse; and the same is true of the wave accompanying deep inspiration. •

It has become conventional to obtain tracings in man with the electrodes in three sites:—

- 1st. Lead or Derivation (D 1).....Right hand and left hand;
- 2nd. Lead or Derivation (D. 2).....Right hand and left foot;
- 3rd. Lead or Derivation (D 3).....Left hand and left foot;

but for special purposes Kraus and Nicolai use the right hand to right foot, left hand to right foot, right foot to left foot. Thomas Lewis has found that he could study the contractions of the auricles more closely by using the electrodes over the precordium and back.

A curve representing the electrical variations due to the heart-beat is

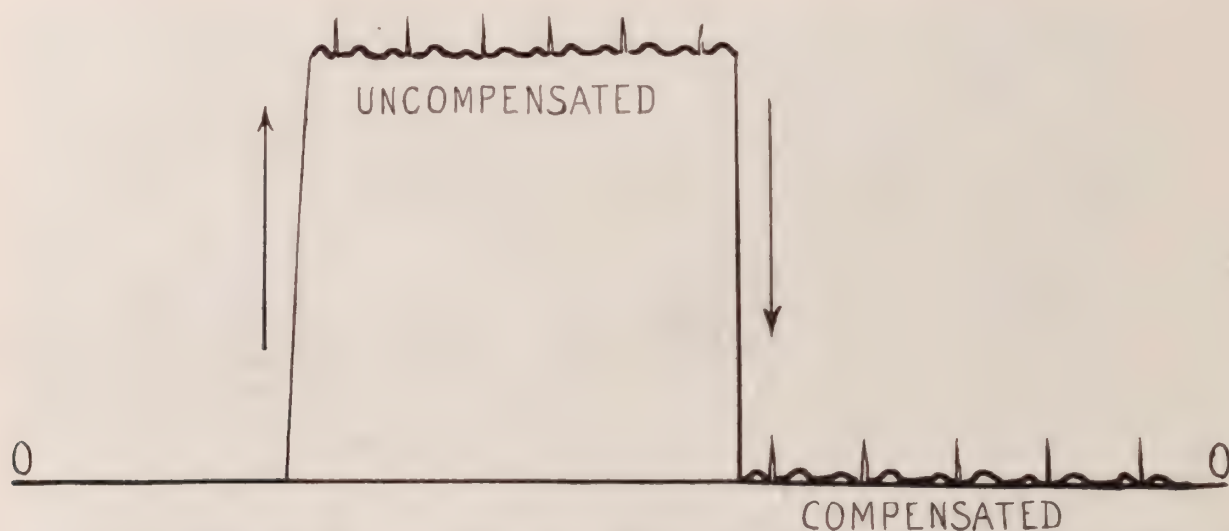
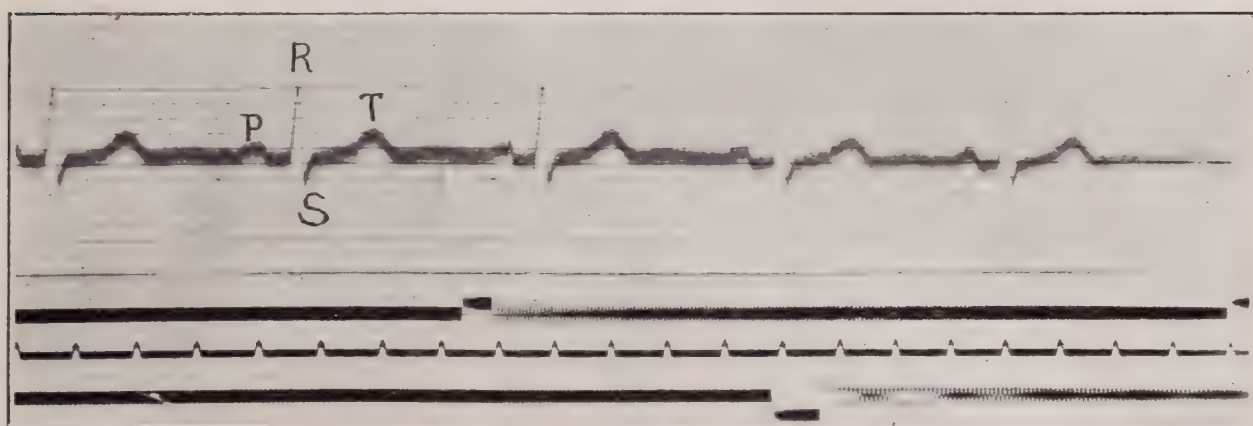


Fig. 3.—Diagram showing the body current and the heart currents, and the effect of the compensating current.

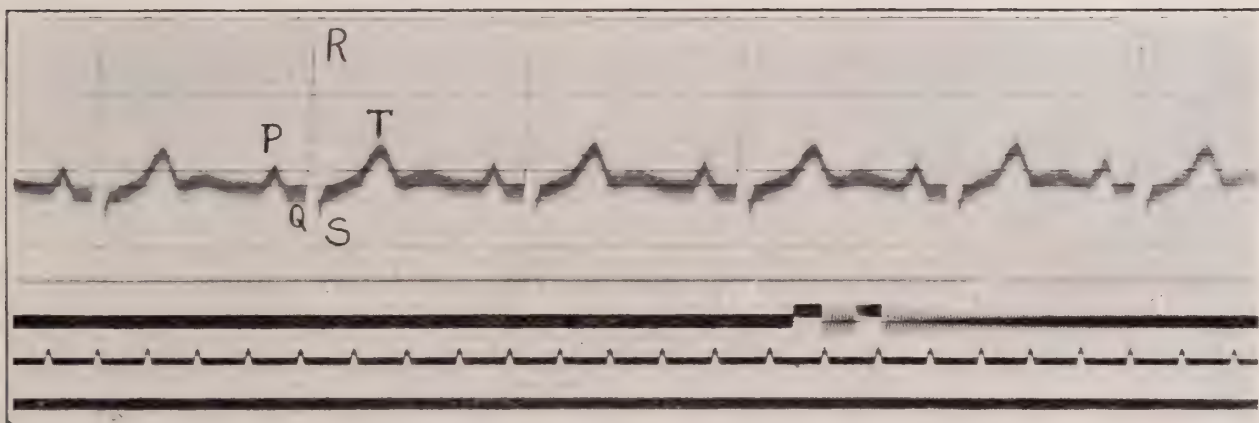
known as an electrocardiogram and that of a normal heart-beat is shown in Fig. 4.* The first part of the curve is represented by a small wave which Einthoven designates by P (presystolic wave) equivalent to a variation of $\frac{24}{10,000}$ volt, coincident with the onset of auricular systole. This is followed by a small depression, Q, below the base-line just before the electrical wave of the ventricle. The ventricular wave (R) is the largest wave of the curve and represents about $\frac{34}{1,000}$ volts. It sets in and subsides within .02 second, and then falls below the base-line to form a depression, S, just before the mechanical contraction of the left ventricle sets in. This is followed by an instant during which the curve remains near the base-line, and then it gradually ascends to form a wave, T, lasting about .1 second in midsystole. There are no waves at the end of systole or in the diastolic period until the beginning of auricular contraction.

*The electrocardiograms presented in this paper were kindly made for me by Dr. G. S. Bond, Assistant in Medicine, Johns Hopkins Medical School, whom I take pleasure in thanking for his hearty co-operation.

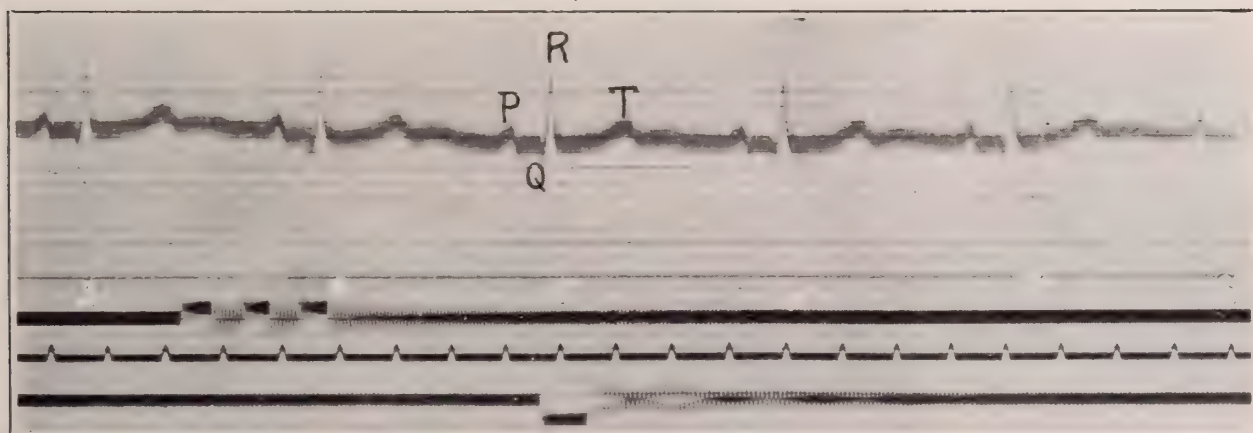
In the perfectly normal curve the tracings taken in the different leads are quite similar (Fig. 4) except that the R wave is largest in the second derivation (D 2). As will be seen, it is not a simple curve, nor



A.



B.



C.

Fig. 4.—Electrocardiograms from a normal man.

A. Tracing taken with the electrodes upon the right arm and left arm (D1).

B. Tracing taken with the electrodes upon the right arm and left leg (D2).

C. Tracing taken with the electrodes upon the left arm and left leg (D3).

The lowest line and the third line from the bottom represent signals, the second line from the bottom represents time in $\frac{1}{5}$ seconds.

does each wave correspond to the contraction of a single chamber, but it is more or less of a composite, the resultant of several different factors. Nicolai has shown that if the heart is upon the right side, dextrocardia, the electrocardiogram is of normal form, but entirely inverted.

It must be remembered, as Gotch and Florence Buchanan have pointed out, that these waves represent the difference of potential between the skin under the two electrodes. If both electrodes remain entirely free from charge, the curve remains at the base-line. But if both electrodes receive an electric charge of the same intensity (say, four millivolts), the difference of potential between them remains zero, and the curve remains at the base-line. It is a matter of empirical fact shown by Kraus and Nicolai that the contraction originating at the base of the right ventricle causes a wave exactly opposite in sign to that accompanying a contraction originating at the left apex; and it has been assumed by these writers that the ventricular part of the normal electrocardiogram represents the algebraic sum of two such almost equal and opposite currents, but that the R S wave, which occurs before the onset of the mechanical contraction, is caused by the impulse passing down the cells of the atrioventricular conduction system. In conformity with this hypothesis, Nicolai⁴ found all the waves inverted in a patient with dextrocardia; but on the other hand Gotch⁵, Buchanan, Straub, and Samojloff found electrocardiograms similar to those of mammals in frogs, snakes and tortoises, in spite of the fact that these animals possess but one ventricle.

Florence Buchanan suggests that it may not be the separate ventricles, but the separate layers of muscle fibres which arise in each papillary muscle. She suggests, moreover, that the R wave is produced by a slight asynchronism between the two ventricles, so that one ventricle only is acting during the instant in which the R wave occurs. This view is shared by Rothberger and Winterberg.⁶ Such an asynchronism has indeed been shown by Knoll,⁷ Frédéricq,⁸ Stassen,⁹ Barker and Hirschfelder¹⁰ during vagus stimulation, and it is possible that even under normal conditions it may exist for a period long enough to just give rise to the deflection of the R wave. It must be admitted that neither of these theories has been proved and both await the confirmation of further experiment.

Whatever may be the factors which give rise to the curve, experiments based upon variations in its form tend to throw some light upon other questions of physiological importance. One of these questions pertains to the site at which the cardiac impulse arises. By homology with the amphibians and reptiles it has always been assumed that the cardiac impulse arises in the region corresponding to the sinus venosus. In the mammalian embryo the sinus venosus or sinus reuniens exists as a separate chamber bounded by the mouths of the venæ cavæ, the interauricular septum and the Eustachian valve, which at this stage of development is relatively large and almost completely partitions it from the cavity of the auricle. As the heart grows, however, the region about the Eustachian valves grows very little, and the sinus reuniens becomes incorporated within the right auricle, so that in the adult it is repre-

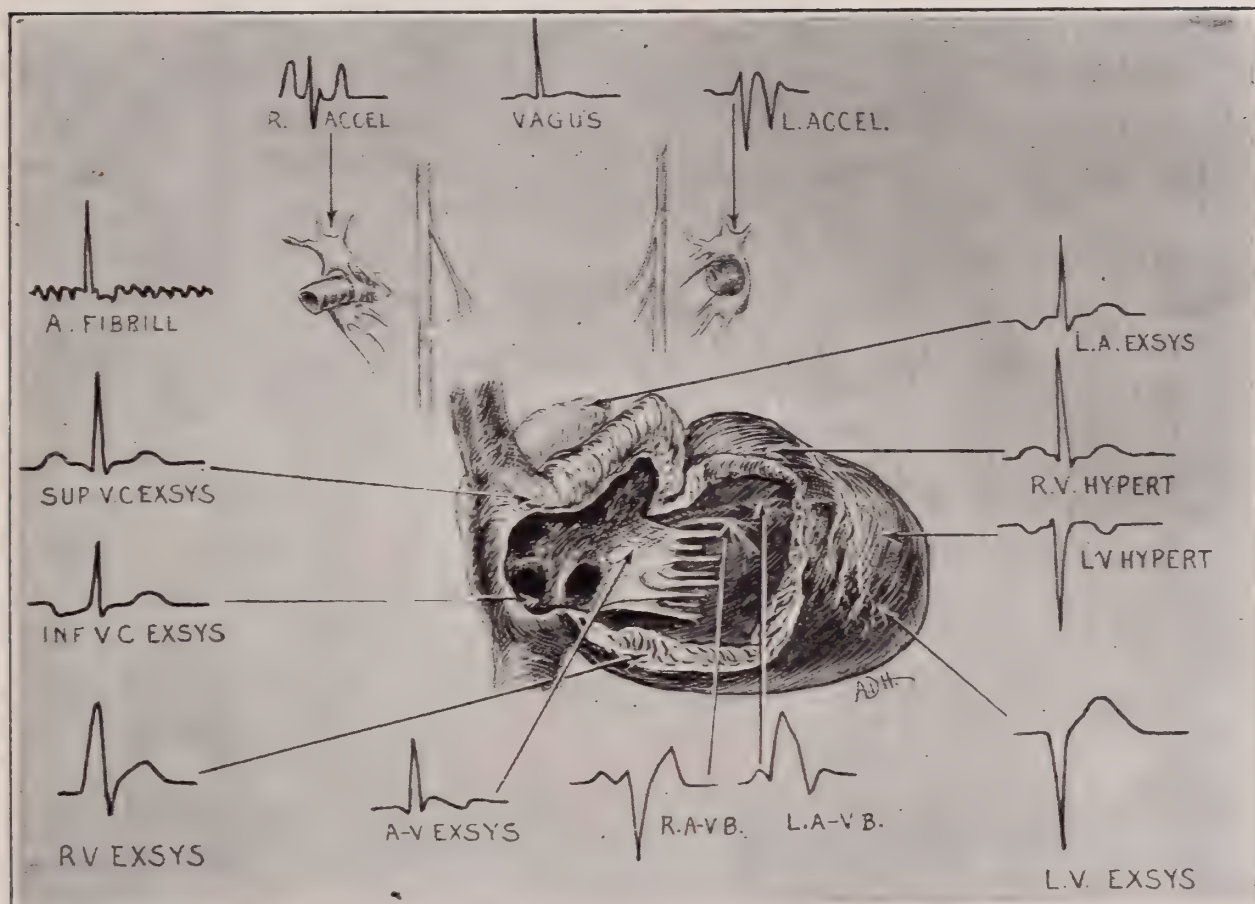


Fig. 5.—Diagram showing abnormal electrocardiograms and the structures in which they arise.

R.ACCEL, electrocardiogram resulting from stimulation of the right accelerator nerve; P, S, T waves increased, R wave diminished.

L.ACCEL, effect of stimulating the left accelerator; P and R waves diminished, S wave increased, T wave inverted.

A. FIBRILL, auricular fibrillation, P wave absent, replaced by numerous small undulations.

SUP V.C.EXSYS, right auricular extrasystole arising in the vicinity of the lower end of the superior vena cava (especially in the vicinity of the Keith-Flack node); all the waves normal.

INF V.C.EXSYS, right auricular extrasystole arising in the vicinity of the inferior vena cava; P wave inverted.

L.A.EXSYS, extrasystole arising in the left auricle; P wave inverted.

R.V.HYPERT, hypertrophy of the right ventricle, all the waves normal, but R wave increased.

L. V. HYPERT, all waves, but especially the R wave inverted; or S wave increased.

RV EXSYS, extrasystole arising in the right ventricle, showing an absence of the P wave, and an abnormal ventricular wave, consisting of a large initial wave followed by a depression and a second smaller wave.

LV EXSYS, extrasystole arising in the left ventricle, showing a large initial depression followed by a large slow wave.

A-V EXSYS, extrasystole arising in the node of Tawara or the His auriculo-ventricular bundle, accompanied by synchronous contraction of auricles and ventricles, showing absence of the P wave and slightly abnormal ventricular waves.

R A-V B, electrocardiogram due to a myocardial lesion affecting the right branch of the auriculoventricular bundle; P wave normal, other waves resembling those due to a left ventricular extrasystole.

L A-V B, electrocardiogram due to a myocardial lesion affecting the left branch of the auriculoventricular bundle.

sented by only a few bundles of smooth muscle fibres lying indefinitely between the venæ cavæ and the auricle proper (Fig. 5). In 1906 Wenckebach described one of these bands which crossed the veno-auricular junction from the superior vena cava to the upper surface of the right auricle and penetrated downward toward the coronary sinus. This was soon confirmed by Keith and Flack,¹² who showed that there was connective tissue all around this bundle or node, although they showed that there were other muscular connections with both superior and inferior venæ cavæ. Their anatomical observations have been confirmed by Schoenberg,¹³ W. Koch,¹⁴ Lewis and Oppenheimer¹⁵ and a host of others.

MacWilliam¹⁶ and later Adam¹⁷ had shown that the intervenous region is the only one at which the application of heat or cold changes the pulse rate.

Frédéricq, Langendorff and Lehmann,¹⁸ and Erlanger and Blackman¹⁹ brought a good deal of evidence to show that the contraction begins in the right auricle and is dependent upon the region around

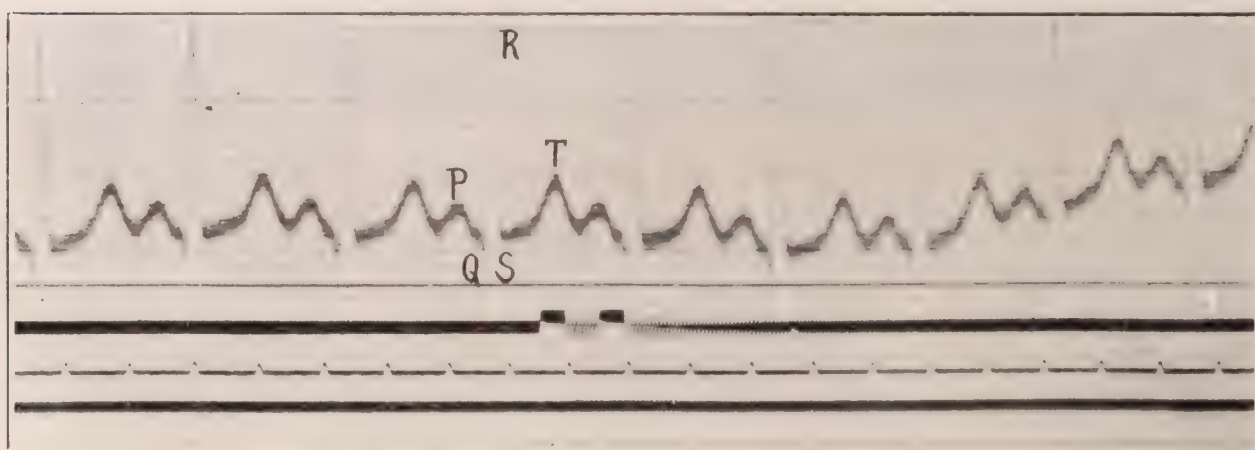


Fig. 6.—Tracing taken in D2 showing hypertrophy of the right ventricle.

the great veins. Quite recently, however, Wybauw has shown by means of the electrocardiogram that the region of Keith and Flack's node becomes negative before any other part of the auricle, and Lewis and Wybauw²⁰ have shown that when artificial stimuli (induction shocks) are applied to any other part of the heart the resultant electrocardiogram is atypical, and that an electrocardiogram of normal form is obtained only as the result of stimuli arising at the Keith-Flack node. Cohn and Kessel²¹ have found that excision of this region was followed in most of their perfused hearts by great slowing of the heart. Flack and also Jæger,²² however, have destroyed it without producing any marked disturbance of rhythm, so that in spite of the predominance of evidence in favor of the Keith-Flack node as the normal pace-maker of the heart, some contradictory evidence still remains to be explained.

In the frog it can be seen that the contraction which originates in the sinus passes on to the right auricle. Bond²³ has demonstrated that just after the contraction of the auricle, the muscle fibres about the auri-

culoventricular ring may be seen to contract, and this is followed by contraction of the ventricle. In the mammalian heart it is probable that the same sequence takes place. From the right auricle it passes to the ventricles over the His bundle and its ramifications, the so-called conduction system. As His,²⁴ Keith,²⁵ and Tawara²⁶ have shown, this system of fibres is distributed in the form of the Greek letter λ . The upper end is composed of a dense plexus of peculiar muscle fibres, the so-called Purkinje fibres, mononuclear striated muscle cells smaller than the ordinary heart-muscle cells and very rich in perinuclear granules. The shaft of the λ forms the bundle first described by His which runs in the membranous septum only to bifurcate into two limbs which straddle the muscular septum, split up into subendocardial and intramuscular fibres and distribute themselves to the wall and papillary muscles of the corresponding ventricles. The bundle is quite rich in non-medullated nerve fibres and as Wilson²⁷ has shown, contains a number of ganglion cells.

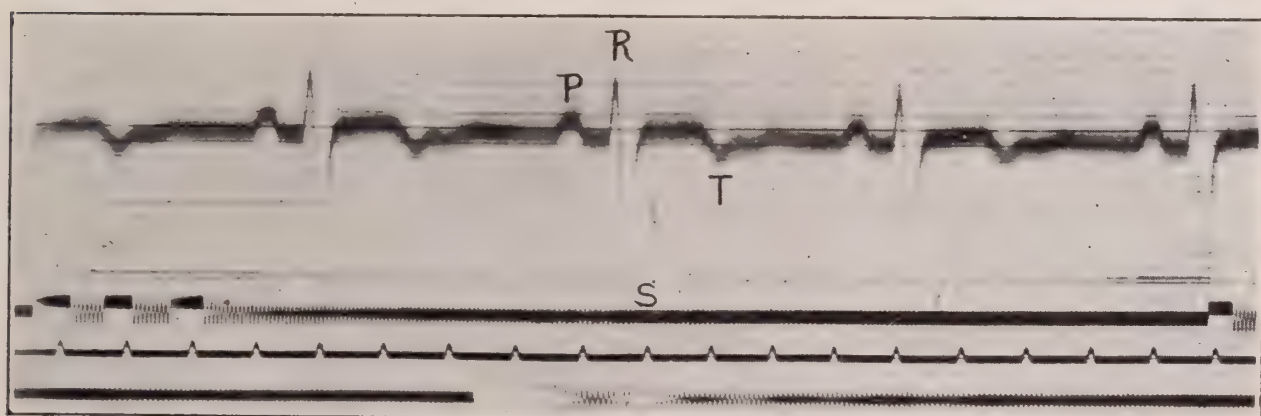


Fig. 7.—Tracing taken in D3 showing hypertrophy of the left ventricle.

As regards the action of the cardiac nerves, Rothberger and Winterberg have found recently that stimulation of the left accelerator gives a curve typical of overaction of the left ventricle, with inverted R and T waves, while stimulation of the right, besides acceleration, gives a curve resembling that of overaction of the right ventricle, *i. e.*, very large P, R, and T waves (Figs. 6 and 7). These curves are exactly similar to the curves, which, when obtained permanently, correspond to hypertrophy of the corresponding ventricle, as Einthoven has shown. They furnish also experimental confirmation for the anatomical findings of Lim Boom Keng²⁸ and v. Schuhmacher,²⁹ that the right and left cardiac supply the corresponding halves of the heart and spread but little to the opposite side.

Rothberger and Winterberg found further that stimulation of the left stellate ganglion, at a period when the action of the sinus region was depressed by cooling with ethyl chloride, gave rise to synchronous contractions of auricle and ventricle, which could result only from stim-

uli arising in the bundle of His (Mackenzie's nodal rhythm). In these cases the electrocardiogram shows no P wave whatever, because the P falls in the time of the R wave. The pulse rate in such cases is not extremely fast nor nearly as high as that in paroxysmal tachycardia.

By means of the electrocardiogram, as well as the phlebogram, it is possible to divide the arrhythmias into several distinct groups:—

I. Irregularity of extracardiac origin, simple changes of rate or instability of rhythm due to periodic stimuli arising in the extracardiac nerves, the vagi or the accelerators. These nerves are normally in constant tonic activity, and the resultant of their tonic activity determines the heart rate. We know, of course, that stimulation from the cerebral cortex inhibits the vagi and stimulates the accelerators, and thus causes a quickening of the heart rate. We know that increased intracranial pressure causes a stimulation of the vagi and a slow heart rate. Other stimuli which act upon the vagus center in the medulla may cause such an inhibition or slowing of the pulse. The most common of these periodic

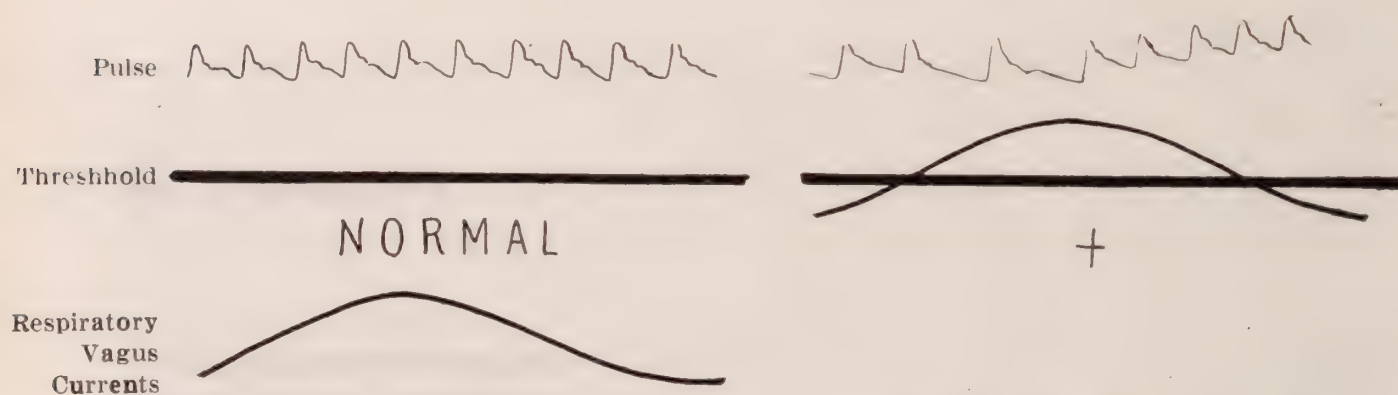


Fig. 8.—Diagram showing the relation of the afferent impulses in the vagus to the threshold of irritability of the medulla. +, medullary irritability increased. The tracing shows the respiratory arrhythmia.

stimuli comes up from the diaphragm at each inspiration. Einthoven, Flohil and Battærd³⁰ have recorded the electric changes in the vagus, and found that at each inspiration there is a wave of negativity (Fig. 8). Ordinarily this has no effect, because it is far below the threshold of stimulation to the medulla. But if any other stimulation is present and added to this, it may raise the reflex stimulation above the threshold and cause it to become an active stimulation, so that we may have a slowing (or sometimes quickening) at this point.

Reflex stimulation of this sort may reach the medulla:—

1. From cortical excitement (emotion or neurasthenia).
2. From intracranial pressure (meningitis, brain tumor, etc.).
3. Reflexes from nasal septum.
4. Reflexes from abdominal organs (uterus, stomach, intestines, prostate, enteroptosis).
5. Increased irritability from toxic agents (tobacco, tea, coffee).

In all these cases the arrhythmia can be removed by a dose of atro-

pine, and in all, except the intracranial pressure group, the blood-pressure is usually low.

II. Tumors or adhesions along the course of the vagi or accelerator nerves, which may press or tug on these nerves during inspiration.

IRREGULARITY ARISING WITHIN THE HEART ITSELF TO ABNORMALITIES
IN THE ORIGIN OR PROPAGATION OF THE IMPULSE.

All these forms may arise from the action of poisons upon the heart muscle. Most are to be found in the two classic papers of Cushny on digitalis and aconite. The diseased heart muscle acts in general like a poisoned heart muscle, and may indeed always be an example of a chronic

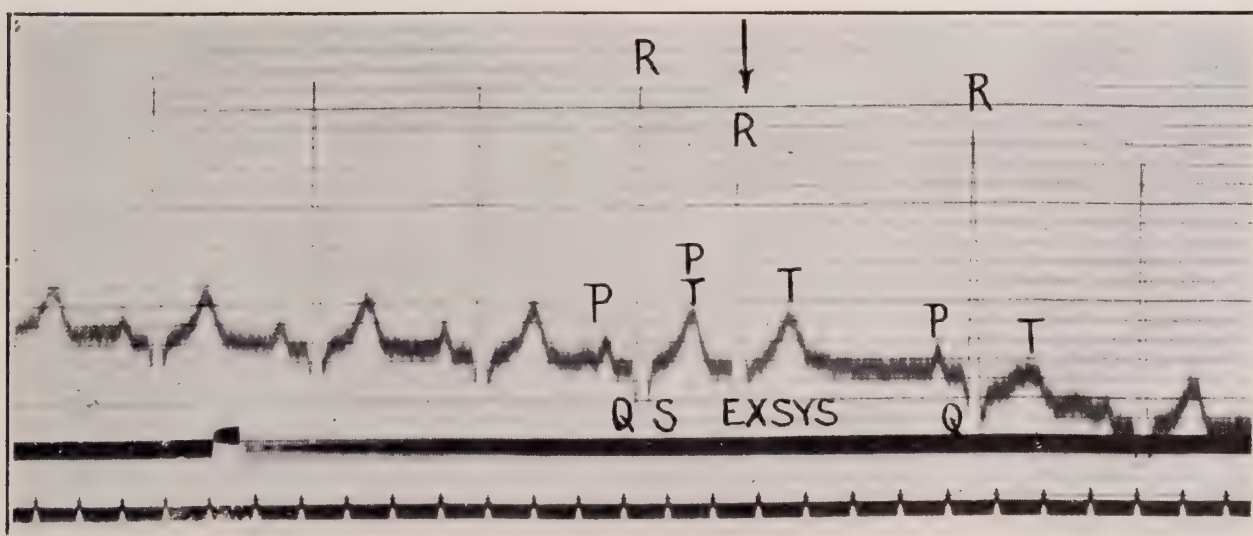


Fig. 9.—Tracing taken in D1 showing an auricular extrasystole arising near the superior vena cava. EXSYS, extrasystole.

poisoning. Most of the cardiac irregularities are brought about by the occurrence of abnormal beats, which in turn correspond to a heightened irritability of the walls of the chamber in which they arise. Abnormal contractions may be of three types—(Hirschfelder³¹):

1. Occasional premature beats (extrasystoles) followed by pauses, causing an irregular rhythm.
2. Approximate doubling of the previous rate setting in suddenly and subsiding suddenly.
3. Fibrillary contractions, rapid irregular contractions in which the fibers of the chamber wall no longer contract simultaneously, but contract one by one without co-ordination, causing an irregular wavy movement of the cardiac wall which expends energy, but does not pump the blood onward.

These three grades correspond to an ascending order of irritability: normal, \longleftrightarrow extrasystoles, \longleftrightarrow doubled rhythm, \longleftrightarrow fibrillation, as can be shown by the following experiment: If we increase the irritability of

the wall by the mildest faradic stimulation, there is no appreciable effect on the pulse rate. If we increase the intensity of the stimulus a little more, the rhythm becomes irregular, by the occurrence of occasional premature beats (extrasystoles) which replace some of the regular beats and are followed by a pause, longer than the usual interval between the heart beats. The regular beat + premature beat (extrasystole) + pause are known as a "bigeminus." In clinical and pathological conditions such heightened irritability is usually the result of stasis and sudden dilatation of the chamber, from inability of the heart to empty itself, from stenosis of a coronary artery (Lewis),³² or from action of some poison upon the heart muscle. Extrasystoles may also occur perhaps reflexly in gastro-intestinal disturbances, especially gastro-intestinal distention.

Extrasystoles may arise in any part of the heart—in the sinus region, in other parts of the right auricle, in the left auricle, in the auriculoventricular bundle, in the right ventricle, or in the left. Each of these forms has certain distinctive characteristics by which it may be recognized clinically.

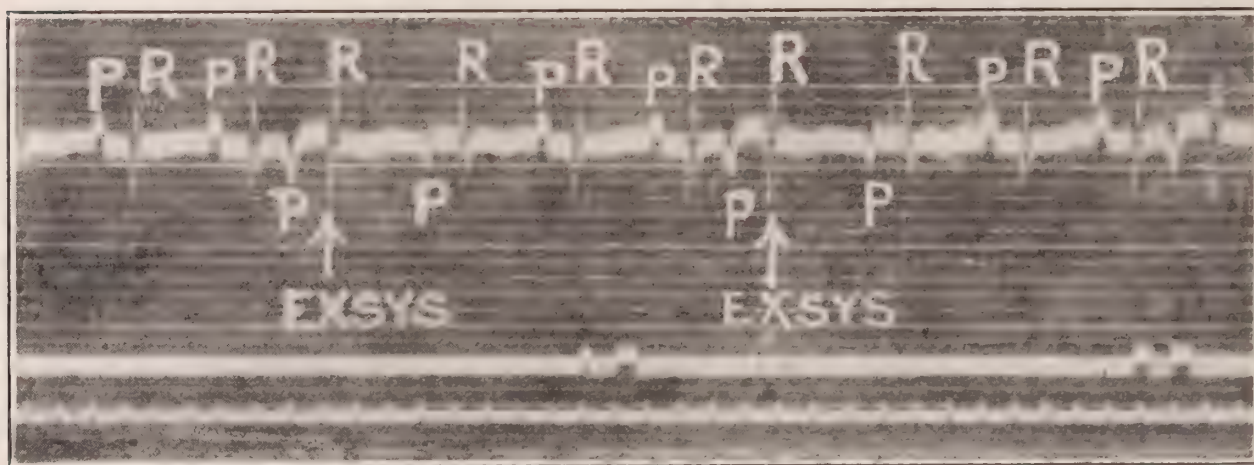


Fig. 10.—Tracing showing auricular extrasystoles arising from an abnormal site.

The P waves of the extrasystoles are inverted.

tricular bundle, in the right ventricle, or in the left. Each of these forms has certain distinctive characteristics by which it may be recognized clinically.

In all auricular extrasystoles, in contrast to ventricular extrasystoles, the form of the venous pulse wave is normal, though occurring prematurely, and the jugular pulsation presents nothing abnormal on inspection, except irregularity in rhythm. The pause following the extrasystole may be shortened (bigeminus less than the time of two regular pulse intervals.)

By the ordinary graphic methods, studies by Hirschfelder and Eyster³³ have failed to reveal any differences between extrasystoles produced experimentally in different parts of the auricles, but recently Lewis and Wybauw have shown that this may be done with the electrocardiograph. According to these observers, an extrasystole which arises from a stimulus near the superior cavo-auricular boundary has the normal form of electrocardiogram and differs from the normal only by having smaller R and T waves. The P wave is normal (Fig. 9). If the extrasystole

arises in the vicinity of the inferior vena cava, the P wave is inverted (Fig. 10); but as he and Rothberger and Winterberg have shown, this may also be true when it arises in the left auricle.

When the extrasystole arises in the cells of the auriculoventricular bundle, the impulse is conducted in both directions and the auricles and ventricles contract simultaneously. Bond has been able to watch this process in the frog, in which he could see the auriculoventricular muscle fibers contract first, and this was followed by the contractions of auricles and of the ventricle, which contracted at the same instant. In mammals it cannot be decided whether the fibres of the conduction system conduct or merely contract, but extrasystoles in which auricles and ventricles contract simultaneously (nodal extrasystoles) are occasionally met with. In

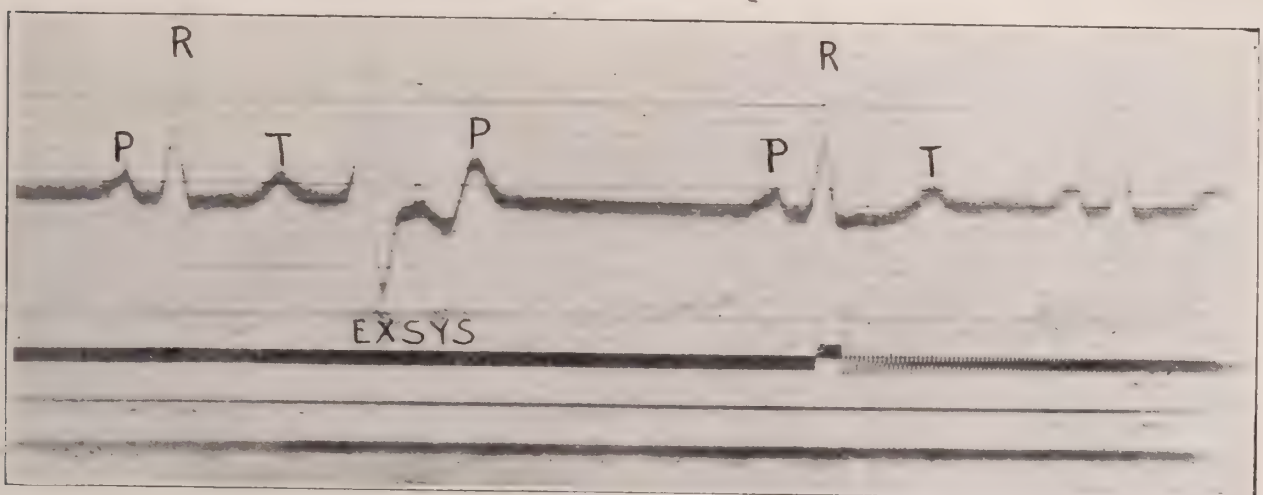


Fig. 11.—Tracing taken in D1, showing an extrasystole arising in the right ventricle.

The extrasystole is followed by a contraction of the auricles (P wave) occurring at the usual time.

the venous pulse these are indicated only by an absence of the auricular (a) wave and in the electrocardiogram by the entire absence of the P wave, while the normal R and T still persist. This form of electrocardiogram is pathognomonic.

Extrasystoles may also arise in either ventricle (Figs. 11 and 12), especially when there is a high blood-pressure and the chamber fails to empty itself. No matter where the extrasystole arises, the two ventricles contract almost synchronously, though the chambers in which the abnormal impulse arises may precede the other ventricle by about .02 second. Kraus and Nicolai have shown that the electrocardiograms of these extrasystoles are absolutely characteristic for each chamber. The venous pulse tracing, therefore, shows merely that a ventricular extrasystole has occurred, as indicated by the large wave during ventricular systole not preceded by an auricular (a) wave; but as Kraus and Nicolai have shown, the electrocardiogram gives tracings which are absolutely typical for right and left ventricle, and indeed are quite opposite in sign. Such

electrocardiograms have shown, in the same patient, extrasystoles sometimes in the right ventricle, sometimes in the left (Fig. 13).

Clinically, extrasystolic irregularities are very common, and the question naturally arises as to what pronostic significance we shall attach to them. Most observers, among them Mackenzie³⁴ and Mueller,³⁵ believe that the occurrence of extrasystoles always indicates the presence of a focus of myocarditis, and a more or less extensive lesion of the heart muscle, but this view is founded upon evidence that is by no means conclusive. Mackenzie, who has by far the most extended experience, states that he has had patients with occasional extrasystoles, who have been under observation for many years without appreciable change in their condition. It is quite frequent to meet with persons, otherwise apparently healthy, who are subject to extrasystoles during periods of

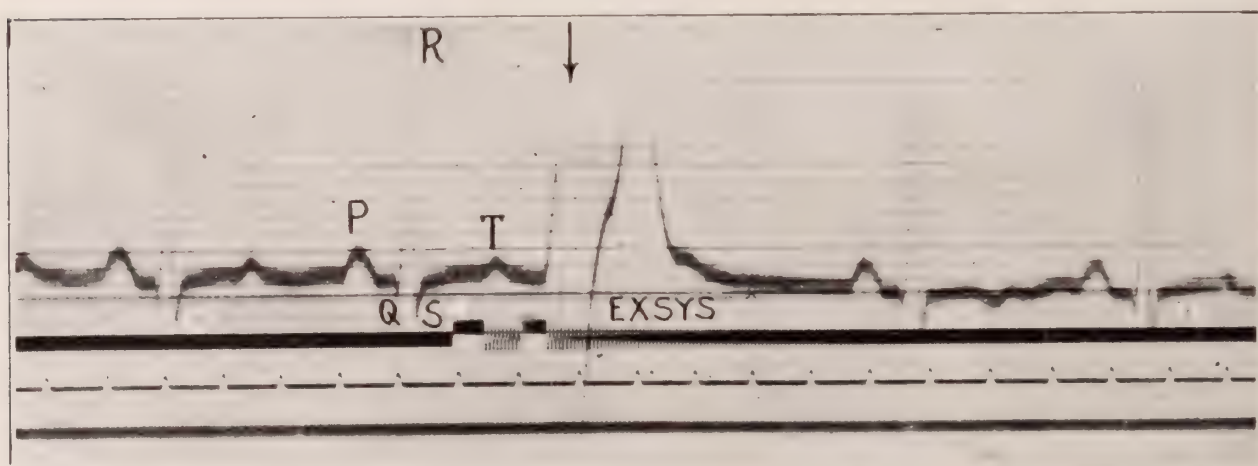


Fig. 12.—Tracing taken in D2, showing an extrasystole arising in the left ventricle.

gastro-intestinal disturbance, especially flatulence and tympanites. Each extrasystole may be accompanied by a distinct sensation of palpitation, and may be a source of great annoyance to the patient; and yet the latter is able to undergo muscular exertion without signs of cardiac weakness. In such persons, as Mackenzie states, the extrasystoles may be regarded as of no little or no prognostic significance, and the patient's general condition may be taken as the best index. There is another group of cases, however, whose heart rate is regular when at rest, but in whom extrasystoles set in as a result of exercise. In these persons the extrasystoles are to be regarded as an expression of a definite form of cardiac weakness, and they must then be taken into consideration like dyspnea, precordial pain, or any of the other danger signals of the circulation.

When the irritability of the heart is very much increased or there is persistent stasis in the auricles, the co-ordinate contractions of the latter may give way to fibrillary contractions. Hirschfelder and Eyster have found with the capillary electrometer, and Rothberger and Winterberg³⁶ and Lewis³⁷ with the Einthoven galvanometer, that the electrical varia-

tion accompanying each fibrillation is about as great as that accompanying each regular auricular contraction; and so one may suppose that the cardiac stimulus is about as great. Hirschfelder³⁸ has found that when a heart is stimulated by induction shocks too fast for it to follow, it responds more or less irregularly, at first by the omission of a few beats and an occasional beat, and in other cases by responding to only half or one-quarter of the original number of stimuli. It seems probable, therefore, that the fibrillating auricle with its 400 to 600 impulses per minute gives birth to such stimuli—impulses which are too fast for the ventricles to follow completely. Accordingly, the ventricles respond irregularly, sometimes to one impulse, sometimes to another, and a permanent irregularity in which, as the electrocardiogram shows (Fig. 14), the ventricular impulses follow the normal course along the auriculoventricular bundle.

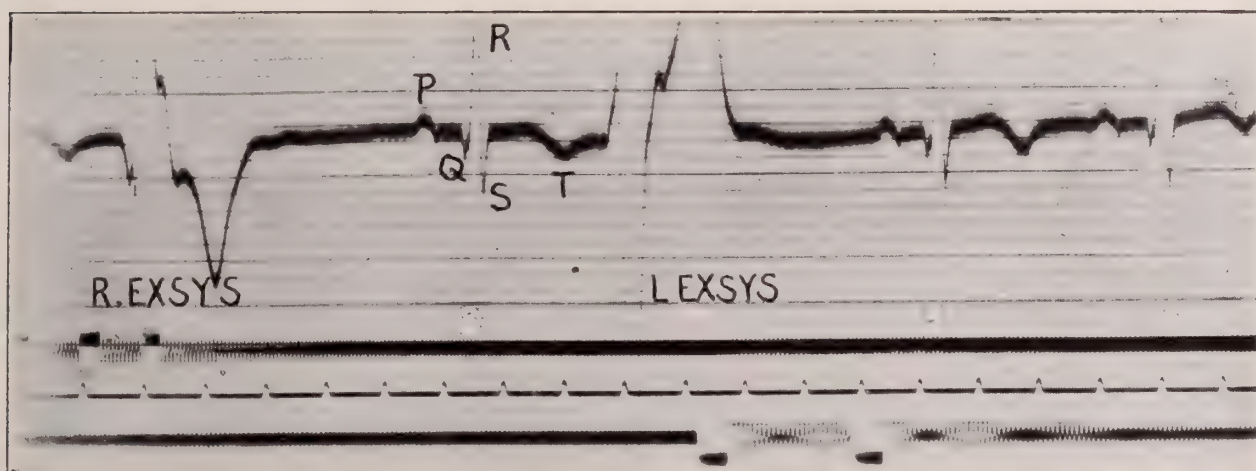


Fig. 13.—Tracing taken in D2, showing one extrasystole arising in the right ventricle and one arising in the left ventricle.

It is this form of arrhythmia which constitutes a large proportion of the absolute arrhythmias that are common in cases of old mitral disease and old myocarditis, and which Mackenzie formerly supposed to be due to a "Nodal Rhythm." The veins in these cases are usually full, and since the auricles no longer contract forcibly, the auricular (a) wave is absent from the venous pulse and the P wave from the electrocardiogram. The venous pulsation is either entirely absent or is represented by a single wave with a plateau or M-shaped crest coincident with ventricular systole. The electrocardiogram shows a normal R wave or an inverted with T usually diminished or absent; but the characteristic feature lies in the fact that the P wave is absent and the fibrillary contractions of the auricles are represented by irregular undulations occurring during both the systolic and the diastolic periods.

Clinically, it is usually, though by no means always, possible to diagnose this form of arrhythmia by simple inspection of the jugular pulsation. In these cases the jugular pulse is "single" (*i. e.*, one pulsation accom-

panying each beat of the heart or each carotid pulsation) in contrast to the normal venal pulse which is "double" (two pulsations accompanying each heart-beat). The pulsations are almost always very small and the veins stand out full and prominent. Ventricular extrasystoles, which are occasionally present, can be distinguished as large waves which shoot up along the external jugular even as far as the upper border of the sternocleidomastoid, furnishing a striking contrast to the small pulsations from the auricular fibrillation.

Irregularities of this form often persist for years, and usually are accompanied by a condition of cardiac dilatation and weakness (Fig. 22). They may be present in mitral disease during the transition periods of heart failure, with the subsidence of which the rhythm returns to normal. Occasionally persistent fibrillation of the auricle and permanent irregularity may persist in an individual who is not suffering from symptoms of cardiac weakness, and as such it may not greatly affect the duration

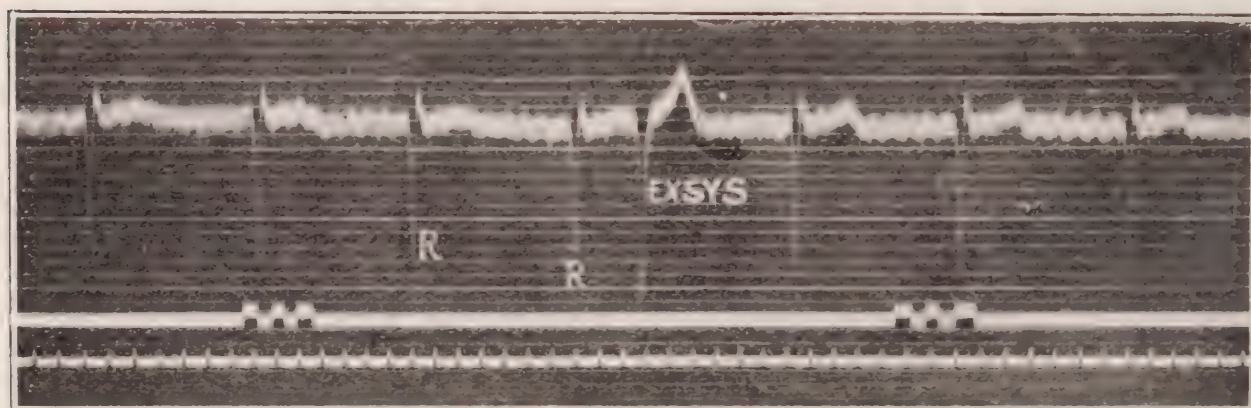


Fig. 14.—Tracing taken in D3, showing auricular fibrillation, absolute arrhythmia, and hypertrophy of the left ventricle; also one extrasystole arising in the left ventricle.

of life. It is this form, as Cushny³⁹ and Windle⁴⁰ have shown, which shows the greatest improvement under digitalis, probably because the latter stimulates the vagus, and, by blocking many of the irregular impulses from reaching the ventricle, allows the latter to attain a slower rate and thus to recover. The prognosis in most cases of auricular fibrillation is therefore not a good one, though the condition itself does not spell impending death.

The ventricles, which are the motive power of the circulatory pump, pump strongly though not regularly, and continue to pump at a rate which maintains the velocity of the blood stream and responds to its altered needs. More commonly, however, when the auricle fibrillates, the ventricle is already following at its fastest pace and cannot increase its rate to meet increased demands upon it during exertion. It is measured entirely by the ability of each heart to respond to the increased demands upon it; by the symptoms of the patient rather than by the nature of the arrhythmia.

Another very closely allied form of disturbed rhythm with increased irritability is the condition known since Bouveret⁴¹ as idiopathic paroxysmal tachycardia. In this condition, as in the experiments already quoted, the heart rate suddenly, within a single cardiac cycle, rises to about double the original rate, and persists at this rate for a time varying from a few seconds to weeks or even months, subsiding equally suddenly to the original rate.

Such paroxysms cannot be produced by either paralysis of the vagi or stimulation of the accelerators in man or animals (Gerhardt,⁴² Hirschfelder). They can, however, be reproduced in dogs by faradizing the auricles (Hirschfelder) or by ligating the right coronary artery (Lewis).

By the former method four types may be obtained:—

1. Approximate doubling of the auricular rate, with lengthened or with shortened conduction time.*
2. "Doubled" rate, with synchronous contractions of auricle and ventricle (nodal tachycardia).
3. "Doubling" of the rate in the ventricle, which may precede the auricle and become the pace-maker of the heart.
4. Fibrillation of the auricle, which the ventricle follows at a regular rate instead of at the irregular rate characteristic of the absolute arrhythmia.

In man, two types of paroxysmal tachycardia have been observed, some with a persistent (a) wave upon the venous pulse and some with a venous pulse of the ventricular type. The former is more common in cases with short paroxysms. Lewis⁴³ and Marris⁴⁴ have thus far described paroxysms of the auricular and the nodal type in man, and cases seen at the Johns Hopkins Hospital have all shown normal or inverted P waves, so that the causation of such paroxysms from ectopic auricular impulses in man is certain. Up to the present, no definite examples of auricular fibrillation in human paroxysmal tachycardia have been revealed by the electrocardiograph, so that it is evident that the response of the human heart and that of the dog's heart to auricular fibrillation are different. While the dog's heart, which is capable of a more rapid rhythm, may respond to the fibrillation with a perfectly regularly beating ventricle, at the accelerated rate this pace becomes too fast for the human ventricles to follow, and the rhythm becomes irregular. Whether paroxysms of tachycardia without irregularity ever results in man from auricular fibrillation can be decided only after a sufficient number of cases have been observed with the electrocardiograph.

The tendency to paroxysmal tachycardia seems to indicate a physiological state of the heart muscle, rather than an anatomical lesion, for in some cases it may be present for thirty or fifty years without any accompanying heart failure or indeed any lesion in the heart at autopsy. In

*The change of rate consists in an absolutely abrupt increase to form 1.6 to 2.1 times the previous heart rate, setting within less than the period of two cardiac cycles and subsiding with the same suddenness.

others, however, especially where there is some complicating disease, it accompanies disease of the coronary arteries (Romberg⁴⁵), and then, of course, it is of grave significance. Occasionally the paroxysms are brought on whenever the patient sits up in bed (orthostatic type), Hewlett,⁴⁶ but they are usually quite independent of posture and muscular exertion.

Disturbances in conductivity and contractility and diminution of irritability may also lead to disturbances of rhythm, notably to heart-block.

If the auriculoventricular bundle is injured either by an organic lesion, by asphyxia, or by a poison such as digitalis or aconite, the cardiac impulse no longer reaches the ventricle, or reaches it only occasionally. Gaskell⁴⁶ has shown in frogs and turtles, and Erlanger⁴⁷ in mammals, that if the auriculoventricular bundle is slowly clamped, the conduction

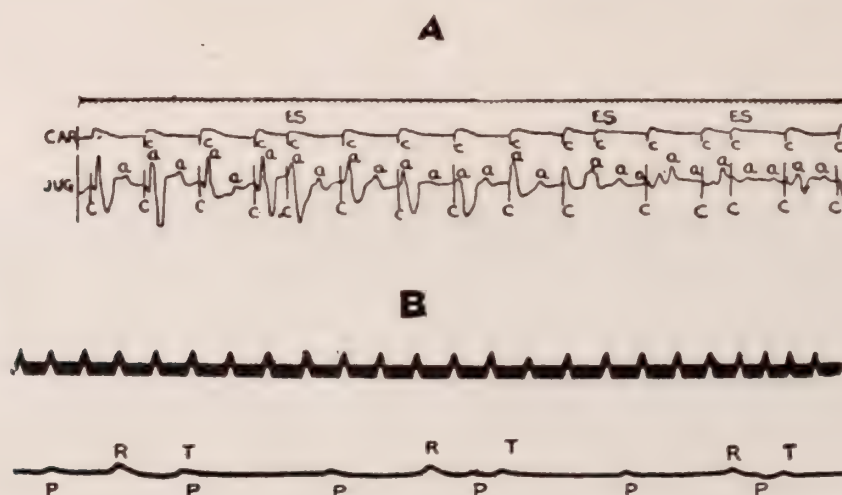


Fig.15.—A, venous and carotid arterial pulse from a patient with complete heart-block and pulse-rate of 33 per minute. B, electrocardiogram from the same patient. Upper line, timer in fifths of seconds, lower line, electrocardiogram. The rate of the atria is about twice that of the ventricles but the complete dissociation between the two is more readily discernible in the electrocardiogram than in the venous tracing.

(After Barker, Hirschfelder and Bond, *Jour. Amer. Med. Assoc.*, 1910, lv., 1350).

Tracing taken with the small Edelmann galvanometer.

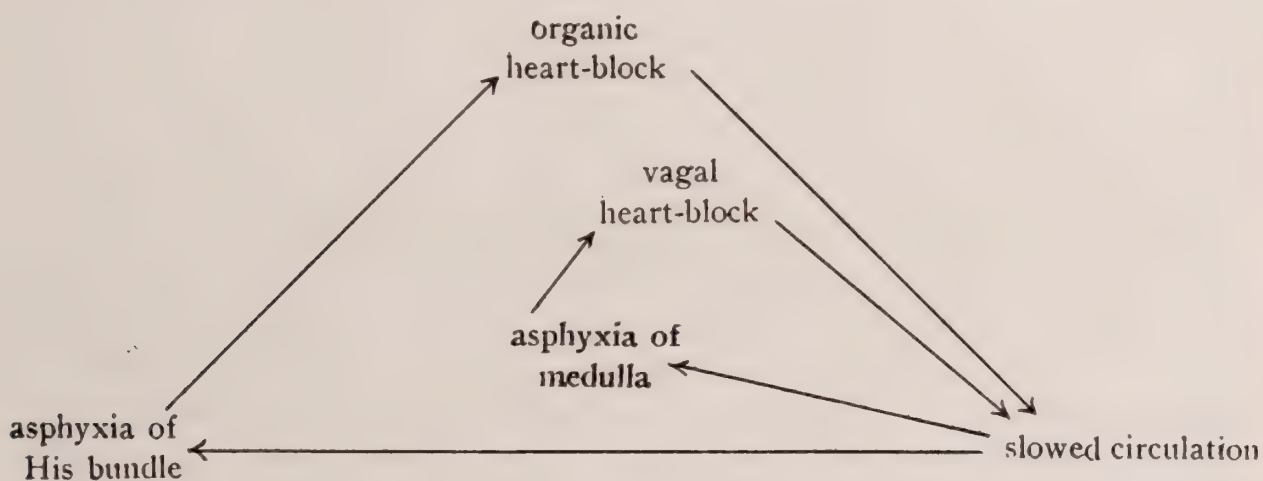
time is at first gradually lengthened, then alternate beats of the ventricle drop out (partial heart-block, 2:1 rhythm), then the block becomes still more intense and a 3:1 or 4:1 rhythm results. If the clamp is now still further tightened, or if from the first it was tightened suddenly, all impulses are cut off from the ventricles and the latter cease to contract for a considerable period (several seconds to half a minute) until they develop a rhythm of their own, which is slower than the rate of the auricles, but bears no relation to them. This pause and subsequent development of the rhythm, as shown by His and Erlanger, represents the cessation of the pulse, the period of syncope, and the onset of bradycardia in the Adams-Stokes syndrome.

Heart-block can in most cases be diagnosed clinically by inspection of the venous pulse, when in a case of bradycardia three or more wavelets can be discerned over the jugular vein for each pulse wave in the carotid,

especially if synchronously with these wavelets the faint ticking sounds of auricular contractions can be made out over the heart. Care must be taken, however, to distinguish these from the third heart sound, which they closely resemble.

In the venous pulse tracing there is rarely any difficulty in making out several auricular (a) waves recurring at regular intervals. This is still easier in the electrocardiogram, for the P waves there are undisturbed by the undulation of ebb and flow, and stand out sharply marked upon the curve (Fig. 15).

Recently, studies by Gibson,⁴⁸ Thayer and Peabody,⁴⁹ and others have shown that in most cases of Adams-Stokes disease the vagi exercise a considerable influence upon the block, especially where the latter is not yet complete. In such cases the condition represented is: Block due to injured His bundle + block due to vagus action. In this case we are dealing with a double vicious circle.



In such cases as Gibson and Thayer have found, administration of atropine may cause lasting improvement or even disappearance of the block by removal of the vagal element, improving the circulation through the bundle and allowing it to recover a certain degree of its conductivity.

The association of ventricular extrasystoles with Adams-Stokes syndrome is quite common and may occur in two ways:—

1. Extrasystoles may arise in the slowly beating ventricle during complete heart-block (notably in the cases of Thayer and in one of the experiments of Erlanger and Hirschfelder).

2. Extrasystoles too weak to open the aortic valves may occur in a heart without any heart-block; and if two or three follow one another between the regular beats, they may give rise to pauses so long that the brain becomes anemic and the Adams-Stokes syncope sets in, as in a case reported by James, and in another recently observed at the Johns Hopkins Hospital.

Occasionally cases of extreme bradycardia (less than 35 beats per minute) have been reported in which a ventricular type of venous pulse was obtained with no trace of auricular contraction upon it. Mackenzie

believed that in such instances the cardiac impulse was originating in the auriculoventricular bundle, and termed them "nodal bradycardias"; but Lewis, as well as Thayer and Bond,⁵⁰ has found that in such instances the electrocardiogram revealed auricular fibrillation plus a complete heart-block.

Towards the therapeutics of heart-block, little has been accomplished. The problem of treating heart-block is a two-fold one:—

1. In partial heart-block, the aim should be toward diminishing the degree of block, and for this purpose atropine is indicated and digitalis distinctly contraindicated.

2. In complete block, once established, it is useless and may even be dangerous to try to restore conductivity. What is needed here is merely to quicken the rate of the independently contracting ventricles in order to maintain the circulation. Bachman has shown that this may sometimes be done by administration of strophanthin, a drug which itself diminishes conductivity. This drug, as well as other digitalis preparations, may, perhaps, by increasing the irritability and rhythmicity of the ventricles, prove valuable *in cases in which the block is already complete*, in spite of the fact that it is harmful in cases in which the block is partial. The degree of the block in each case should be carefully studied by graphic methods before it is used.

Electrocardiographic studies have also thrown light upon another type of partial heart-block, the partial interventricular block. Barker and Hirschfelder,¹⁰ had shown that cutting the left branch of the His bundle did not give rise to any block between the right and left ventricles or hemisystole. These results have been confirmed by Cohn and Trendelenburg,⁵² and by Rothberger and Eppinger. The latter observers have found, however, that when the left branch of the bundle is cut, the ventricular portion of the electrocardiogram assumes the form of right ventricular extrasystoles; and when the right branch is cut it assumes the form of left ventricular extrasystoles, although both ventricles still contract. The excitation evidently reaches the intact side of the heart first, and this determines the form of the electrocardiogram. By these criteria Eppinger and Størck⁵³ have been able to diagnose correctly endocardial lesions affecting one branch of the bundle of His in two cases. That the criterion alone is fallacious was shown by a case whose electrocardiogram would correspond to that of a lesion in the left branch of the His bundle, which was recently under observation in the Johns Hopkins Medical Clinic, for no lesion of the bundle was to be found at autopsy. More cases of this type will have to be observed before the diagnosis can be made with certainty.

PART II.

THE FILLING AND EMPTYING OF THE HEART UNDER NORMAL AND PATHOLOGICAL CONDITIONS.

Very few of us have obtained from clinical observation of the patient a very clear idea of exactly how fast and to what extent the normal heart empties itself in systole, and whether that occurs as one sudden spurt at the beginning of systole, or as a uniform outflow throughout the systolic period. Nor have we, as a rule, a very clear idea of just how much residual blood there is left within the ventricles at the end of the systolic contraction, nor to what degree the amount of residual blood may vary before signs of cardiac weakness show themselves. On the other hand, our ideas of diastole have been equally hazy. We cannot learn from clinical observation, whether the ventricles are filled by a steady stream, or whether, as Harvey supposed, but little blood enters them until forced in by the active contraction of the auricles; nor do we know by any clinical evidence the exact position which the valves occupy in diastole. All these points are, as you shall see, matters which directly concern us in physical diagnosis and in treatment, but they cannot be made out by physical diagnosis nor even by examination with the fluoroscope and the orthodiagraph. They can be studied only by accurate registration of the change in volume of the heart.

Such records have revealed a good deal that is important in normal and in pathological conditions, and have thrown light (1) upon the causation of abnormal heart sounds, (2) upon the border-land between exercise and cardiac overstrain, (3) upon the interpretation of the functional tests of cardiac efficiency, and (4) upon their bearing on gymnastic treatment and hydrotherapy, and (5) lastly, have taught us much regarding the action of drugs and the indications for using them.

Our accurate knowledge concerning the filling and emptying of the heart may be said to date from the studies of Prof. Yandell Henderson,⁵⁴ (Fig. 16) of Yale in 1906. Henderson took a rubber ball, inserted a glass tube on one side, and cut a window on the opposite side large enough to slip the ball over the heart. He cemented a ring of thin rubber dam around the edges of the window, so that when the ball was slipped over the ventricles it fitted air-tight about the auriculoventricular groove, enclosing both ventricles in an air-tight chamber. When the glass tube is then connected with a large recording tambour, changes in volume of the ventricles may be recorded as rapidly as they take place. For comparison with pulse curves, it is a little more convenient to turn the tambour upside down, so that upstrokes indicate outflow from the ventricles, downstrokes indicate filling, and a level line shows that no change of size is taking place at all.

Henderson showed that if we record the volume curve of a rather slow heart, we find that the following events occur in the cardiac cycle:—

1. An instant (.03-.07 second) just before the aortic valves open, during which there is no change in size. This, as phonographic records teach, is the period of the first heart sound, and represents almost its entire duration.

2. Then comes the period during which the blood is forced out of the ventricles in a uniform spurt. This lasts about .25 second, until the end of systole. This is the period of the short pause between the heart sounds. As we shall see later, the normal heart does not empty itself completely in systole.

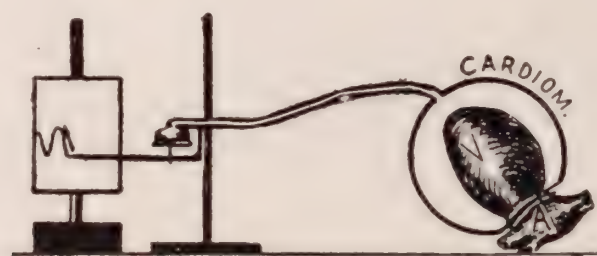


Fig. 16.—Device for registering changes in volume in the mammalian heart, showing the cardiometer (CARDIOM) in place with the rubber ring fitting tightly over the auriculoventricular groove. The recording tambour is inverted, so that upstrokes indicate diminution in the size of the heart. [From Hirschfelder's, *Diseases of Heart and Aorta*. Reproduced by courtesy of J. B. Lippincott Co.*]

3. At the instant that systole ends, aortic and pulmonary valves slap closed, the second heart sound occurs, the mitral and tricuspid valves open, and the ventricles begin to fill. The pressure of blood in the auricles and veins drives the blood into the ventricles. This rush of blood fills the ventricles quickly, almost as quickly as they empty themselves in systole, and it fills them so completely, that when the pulse rate is slow the walls of the ventricle are stretched and the filling comes to an end some time before the auricle begins to contract.

4. There is, therefore, a period which Henderson terms "diastasis," in which little or no blood enters the ventricles, but in which it stagnates in the auricles and veins.

5. This is followed by the period of auricular systole, when the auricle contracts and pumps a very small amount of blood into the ventricle, usually less than one-fourth the total amount.

We can obtain a very clear picture of the filling of the heart by a very old and a very simple experiment which was devised by A. Baumgarten,⁵⁵ in 1843. If we obtain an ordinary calf's heart or pig's heart, and cut away the auricles so as to expose the mitral and tricuspid valves,

*The Publishers are also indebted to J. B. Lippincott Co. for permission to reproduce Figs. 71, 79, 117, 118, 131 and 132-I, from Hirschfelder's *Diseases of Heart and Aorta*.

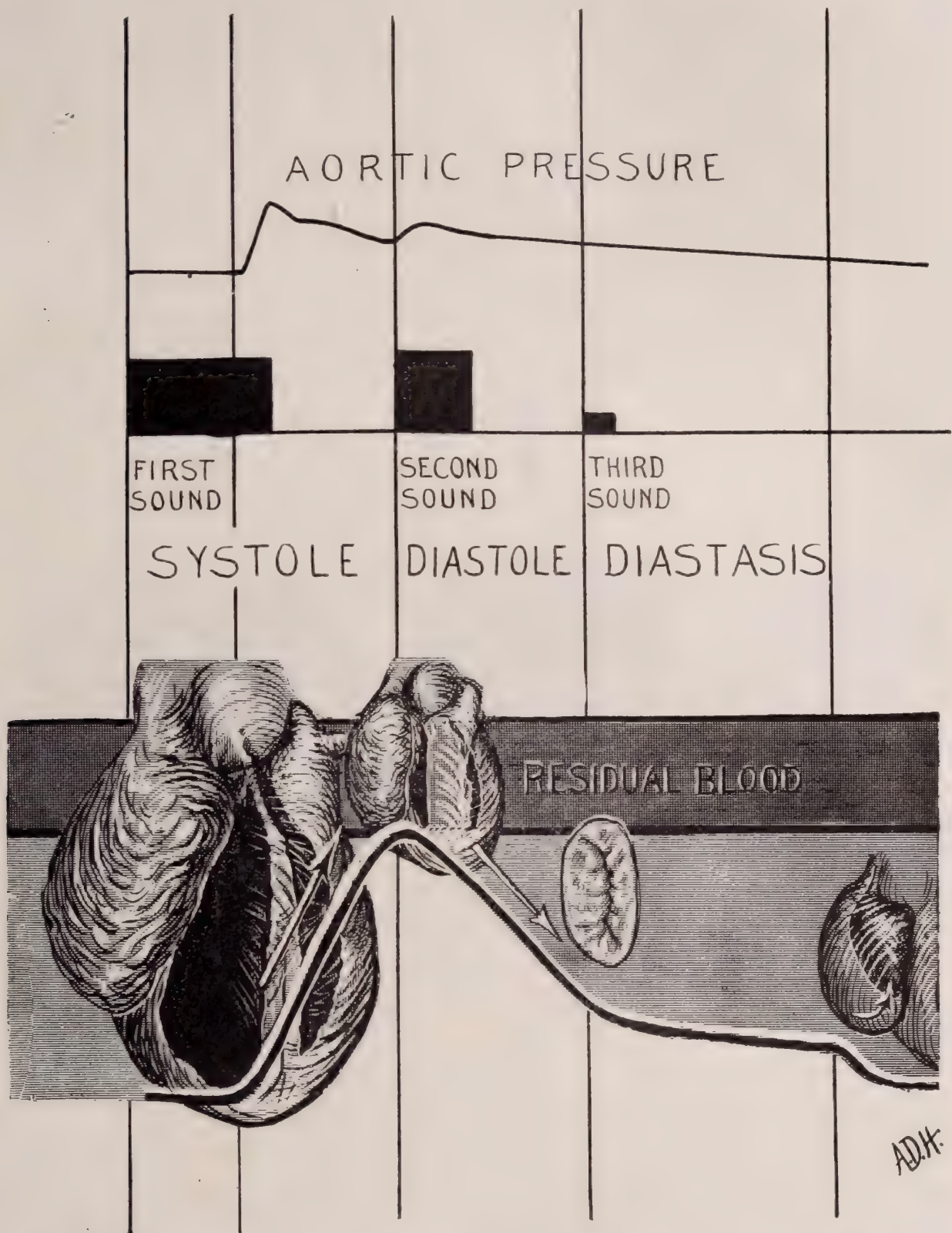


Fig. 17.—Diagram showing the events of a single cardiac cycle. The upper curve indicates the pulse in the aorta. - The black rectangles indicate the incidence of the heart sounds. The hearts shown semi-schematically below indicate the relative volumes at different phases of the cardiac cycle corresponding to the normal volume curve which constitutes the lowest curve in the figure. These hearts are drawn by referring the corresponding points upon the volume curve to a common base-line, and taking the ordinates as the long axis of the heart. The changes in appearance are slightly exaggerated.

Downstrokes represent filling, upstrokes represent emptying of the ventricles. The sketch at the transition from diastole to diastasis represents the probable position of the mitral and tricuspid valves at that instant. The sketch at the right indicates the period of auricular systole. The heavily shaded zone indicates the amount of residual blood.

we can pour in water from a beaker above them and can watch the filling of the ventricles. If we pour it in slowly from a very small height, the ventricle is filled slowly and is not dilated by the inflow, and when filling ceases the valves remain widely separated. If we pour it in from a height of 10-20 cm., the ventricle fills more completely, and at the end of the influx the valves are found to be floated or slapped together along the greater part of the line of closure, and they are separated over only

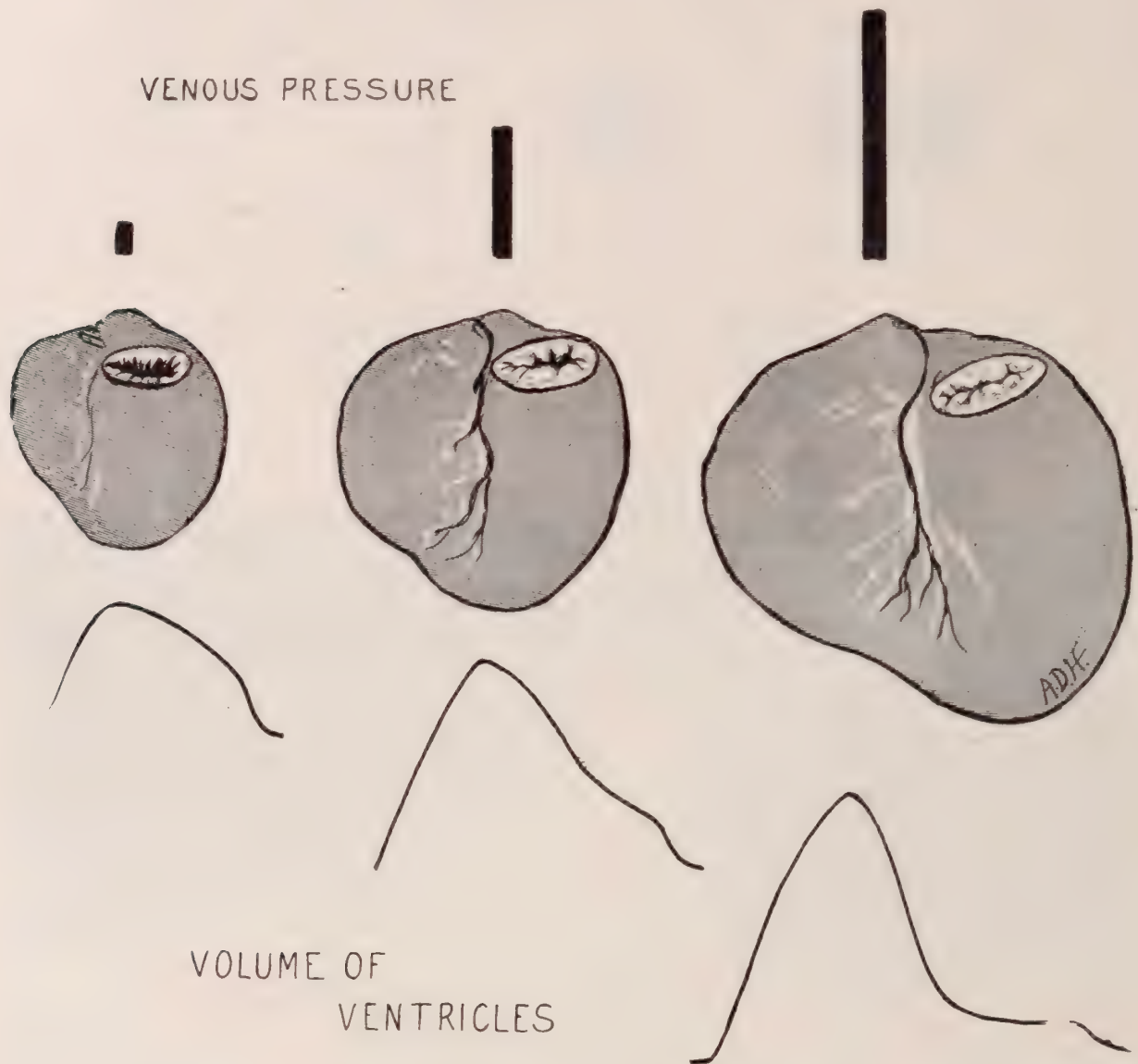


Fig. 18.—Diagram showing the effect of varying venous pressures upon the volume of the heart, upon the rapidity of filling of the ventricles (volume curve), and upon the position assumed by the mitral and tricuspid valves at the end of the first inflow into the ventricles. The figure to the left shows the valves remaining open, that in the middle shows partial closure (functional stenosis), that upon the right complete diastolic closure.

a small area. If we pour the water in from a height of many centimetres, the ventricle is overfilled and dilated by the inrush of the stream, and its walls are put upon the stretch, so that as soon as the inflow ceases the stretched muscle recoils and the valves are suddenly snapped together. This is exactly what occurs in the normal heart at the end of the rapid filling, especially in the heart of a young person or animal whose heart

walls have a high elasticity. Such a slapping together of the valves would naturally give rise to a recoil wave upon the pulse in the jugular vein, and in 1907, while examining a very athletic young man whose heart rate was slow, I encountered exactly such a wave upon the venous pulse.⁵⁶ I noticed that at the instant of this recoil wave (which I designated by the letter h), there occurred a very faint third heart sound, the sound of protodiastolic gallop rhythm; and I then suggested that both the wave and the heart sound might be due to this diastolic slapping together of the valves. The same explanation was given independently some months later by Gibson⁵⁷ and Thayer,⁵⁸ and Einthoven⁵⁹ has recorded such a sound with the microphone, and finds that it occurs 0.18 of a second later than the second sound, at exactly the instant when it might be expected from the shoulder on the volume curve. Quite recently I had further confirmation of this while examining a man, whose left chest wall was removed for empyema, and whose left ventricle therefore expanded and contracted just under the skin. The emptying and filling and the diastasis lasting $2/5$ of a second, could be easily seen; and a definite third heart sound could be heard at the apex at the very instant that filling of the ventricle became complete.

The third heart sound is very soft and distant, not louder than the tick of a watch, and sometimes has a slightly rumbling character. It is very easy to miss unless one is listening particularly for it, determined to catch the faintest possible sound,—and then its detection is quite simple.

Thanks to Thayer, we know now that this third heart sound is a normal and frequent occurrence. It is met with in 50 per cent. of all normal individuals, and between the ages of ten and twenty it is found in 85 per cent. It is most frequently heard at the apex when the subject is lying on the left side, but very often is heard over both ventricles or indeed, over the whole precordium.

Now, I do not wish to leave you under the impression that I believe that the mitral and tricuspid valves are always completely closed during the greater part of diastole; the same experiment, which shows that the cusps close, shows equally well that unless the valves are closed very tightly they quickly reopen at least one point along the line of closure.

The exact position which they assume depends upon various factors. If one pours fluid into the ventricle from a height of 2 to 5 cm. the cusps remain open throughout. If one pours it in from a height of 10-20 cm., they close everywhere except at one small area near the middle. *There is a functional stenosis.* If one pours it in from a much greater height, they snap entirely together. The functional stenosis of the mitral orifice can be produced also whenever there is a certain balance between the pressure in the auricle and the pressure in the ventricle. This reaches its ideal condition in aortic insufficiency, in which the intraventricular pressure during diastole may be relatively high and require a forcible auricular contraction of the auricle to overcome it; and a thin stream

is forced through the narrowed orifice downward toward the ventricle. In aortic insufficiency the jet of blood regurgitating from the aorta often strikes forcibly against the anterior cusp of the mitral valve, and by its impact pushes it over into the mitral orifice, thus adding to the forces which tend to produce a functional stenosis (Hirschfelder⁶⁰).

The presystolic murmur, ordinarily known as the Flint murmur, which is so common in aortic insufficiency, but so transitory in its duration, might easily be caused when a functional stenosis of the mitral is produced by such a balance between the pressure within the ventricle and that within the auricle. It is, indeed, interesting that Austin Flint,⁶¹ himself suggested the possibility of such a functional stenosis; but, as he gave no evidence to show how it might occur, the suggestion gained no credence.

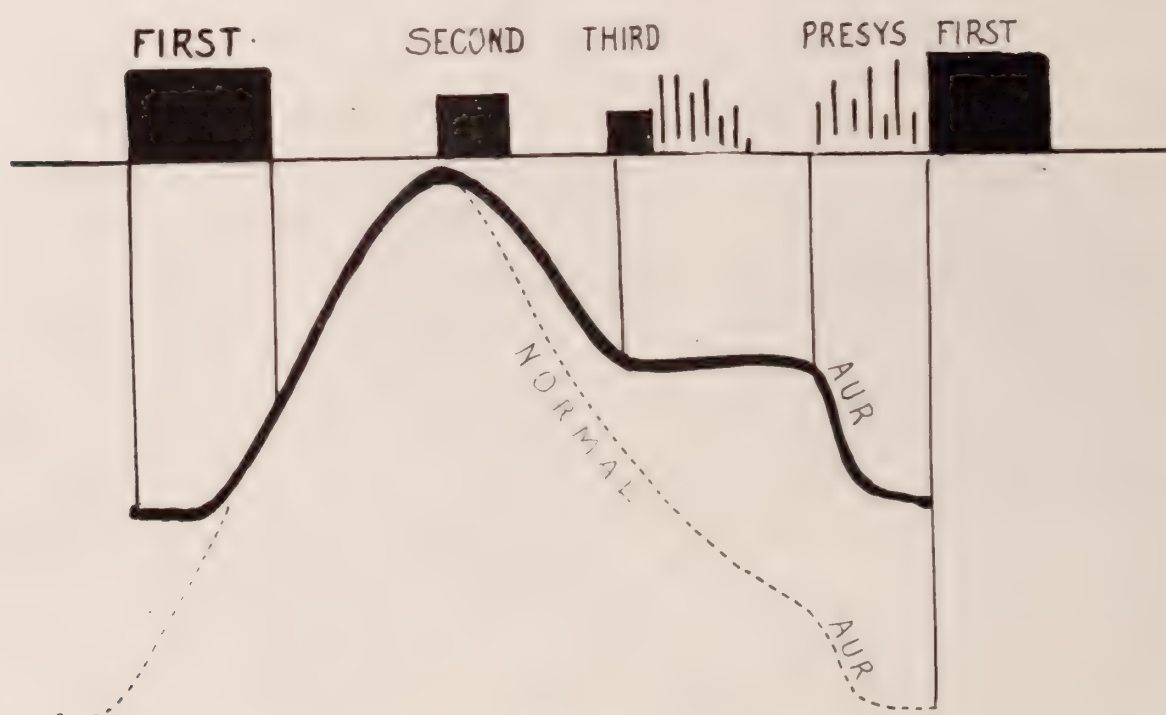


Fig. 19.—Volume curve in experimental mitral stenosis and its relation to the heart sounds and rumbles. The light broken line indicates the normal volume curve. The first heavy line indicates the volume curve in mitral stenosis; the shaded black rectangles indicate the first, second, and third heart sounds, the shaded portion indicates the middiastolic and presystolic (PRESYS) rumbles. AUR indicates the period of auricular systole.

Moreover, in aortic insufficiency we find loud third heart sounds and middiastolic rumbles, all phenomena which are in accordance with this theory of the diastolic approximation of the valves.

In mitral stenosis, on the other hand, we have a different phenomenon. Here we have to deal with three kinds of sounds in diastole; a rather early and loud third sound or protodiastolic gallop rhythm, a middiastolic rumble, and a presystolic or auriculosystolic crescendo murmur. If we produce an experimental stenosis of the mitral orifice we find that the form of the volume curve changes. Less blood enters the ventricle in early diastole and the stagnation in diastole sets in earlier. Correspond-

ing to this there is a very early protodiastolic sound or third heart sound, and if the valves are thickened it is louder and more distinct than usual. Indeed, it was just in mitral stenosis that this sound was first described by Bouillaud in 1835 as the *bruit de rappel* or "echo sound."

This sound is often prolonged into the middiastolic rumble. Potain and Sansom thought that both the sound and the rumble are due to an "opening snap" of the mitral valve, but it appears to me more likely that it is a "closing snap" accompanying the diastolic closing or partial closing of the valve. James Mackenzie⁶² calls attention to the fact that we can differentiate this middiastolic rumble from the presystolic, by the fact that it is decrescendo in character, while the presystolic, or as Gairdner termed it, the auriculosystolic rumble, due to contraction of the auricle, is crescendo in character.

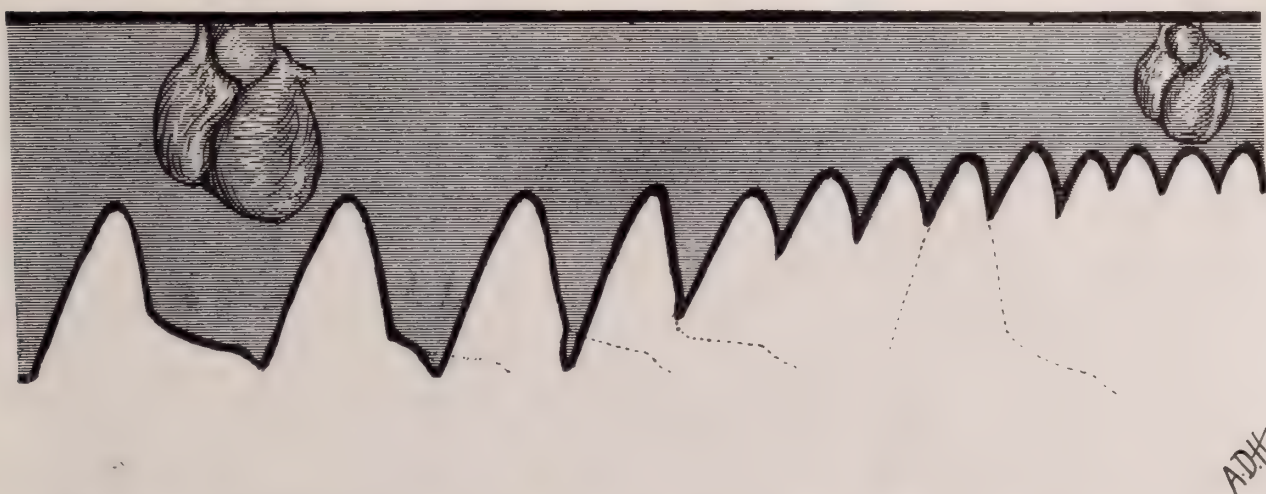


Fig. 20.—Volume curves of the ventricles at increasing pulse rates. The shaded zone indicates the amount of blood within the heart at each instant, the sketches at right and left indicating the size of the heart pictorially. The light broken line indicates the volume curve as it would appear if the heart rate were slow.

These I think may show you some of the points in which studies upon the volume curve have been of use to practical physical diagnosis. I shall now turn to the more practical side and show their bearing on the observation and course of the disease.

Henderson has shown that, under most normal conditions, practically the same volume curve of which we have spoken is met with at all heart rates, except that as the rate becomes more rapid, the period of diastasis is shortened and finally is cut off entirely, so that the cardiac cycle then consists of the full period of outflow and the full period of rapid inflow and the period of auricular pumping. You will notice that although the rate is quickened the heart fills as much as before, each beat throws out as much blood as it did before, so that the total blood flow per minute is increased. If the rate is increased a little more, the diastolic filling is encroached upon and less blood has time to enter the ventricle, so that

correspondingly less blood is forced out. Within the normal rates, however, this diminution in filling is proportional to the pulse rate, so that the product of outflow by rate is constant. That is, for example, at a rate of 60 the heart might pump out at each systole twice the amount of blood pumped out at a rate of 120, so that the amount of blood flowing through the aorta per minute in both cases would be the same. However, as the rate becomes too fast, the tonus of the heart muscle plays a more important rôle and prevents the proportionate filling, so that it does not have time to fill, and consequently cannot drive out enough blood with

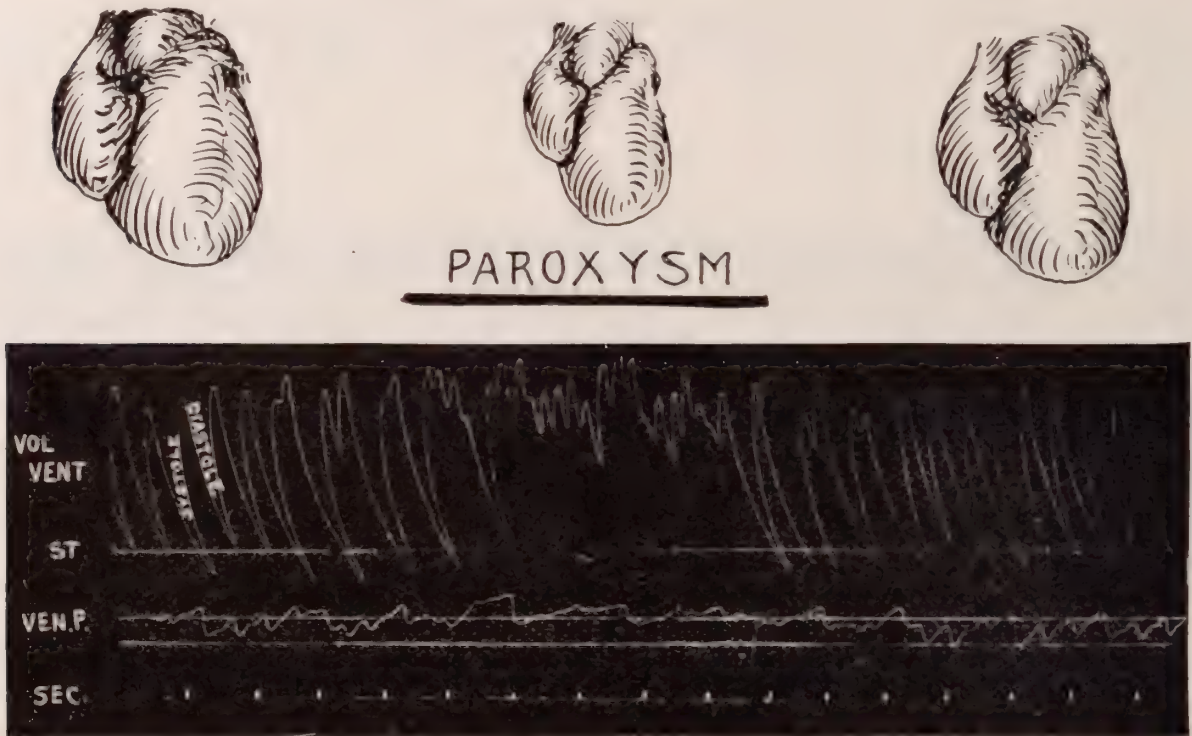


Fig. 21.—Diminution in the volume of the ventricles and rise of venous pressure in experimental paroxysmal tachycardia. Vent. Vol.=volume of the ventricles; Ven. P.=venous pressure; St.=stimulation of the auricles with induction shocks. Sketches above indicate size of heart at the corresponding period, as indicated by the volume curve referred to its base-line. This semidiagrammatic representation slightly exaggerates the apparent change in size of the heart. (Illustration from author's article, *Arch. of Int. Med.*, Vol. VI.)

which to keep up the circulation. We have then two forms of failure of the circulation from mere changes in rate:—

1. Slowed circulation from too slow heart beat with a large heart—bradycardia—of which we have evidence in the syncope of Adams-Stokes disease.

2. Slowed circulation from too fast heart rate with a small heart—tachycardia—of which we have occasional examples in the syncope that occurs in paroxysmal tachycardia and in the fainting of athletes.

You will see in the tracing an example of this shrinkage of the heart in a dog during the course of an experimental paroxysm of tachycardia from stimulating the auricle until fibrillary contractions of the auricle have set in; and you will notice that with the onset of the tachycardia

the heart becomes much smaller—and the venous pressure rises, which shows that the blood cannot enter the ventricles because it has not time to do so. The circulation fails because the heart is underfilled. He believes that when the carbon dioxide of the blood falls below normal on account of too rapid breathing or of fever or acidosis, fluid leaves the vessels and passes into the tissues. The vessels thus become emptied just as they are emptied from hemorrhage, and pressure in the veins falls to so low an ebb that the heart is not well filled but remains much smaller than normal. Its contractions also are smaller, and so little blood is sent out into the arteries that the latter are not overfilled and the arterial pres-

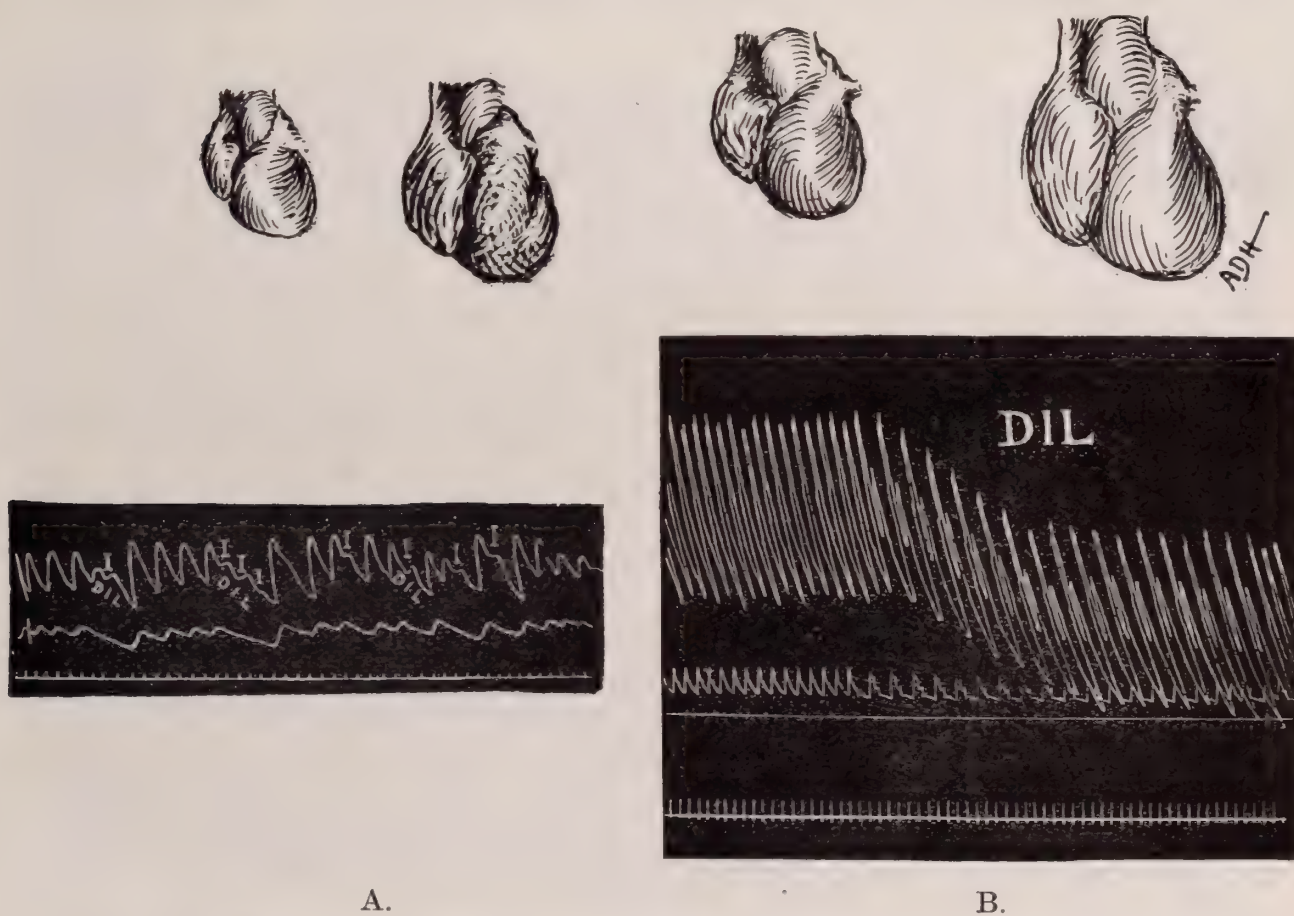


Fig. 22.—Effects of producing an irregular rhythm upon the volume of the ventricles.

A—Extrasystolic irregularity produced by repeated induction shocks. I, I, I, ineffectual extrasystoles too feeble to force the aortic and pulmonic valves open. DIL, dilatation of the ventricles.

B—Continuous bigeminal rhythm due to the entrance of a bubble of air in the right auricle showing the great dilatation of the ventricle as a result of the irregularity. (Kindness of Dr. P. D. Cameron.)

sure falls in consequence. These views are somewhat at variance with the theory of vasomotor failure which Romberg and Pæssler,⁶³ Crile,⁶⁴ and others have advocated, but Henderson,⁶⁵ has been able to produce the whole group of conditions by over-ventilation of the lungs, and he has shown that the heart and most of the vessels are smaller in shock than at other times. Seelig and Lyon, on the other hand, have shown that the viscera contain less blood in shock than under normal conditions.

We find the same condition—namely, the underfilled heart, clinically in many cases when we examine the heart with the orthodiagraph or percuss its outlines very carefully. We also find these conditions in enteroptosis in which, just as Leonard Hill has shown upon the rabbit, which stands on its hind legs, the blood gravitates into the abdominal veins and does not fill the heart, in many patients during attacks of paroxysmal tachycardia, and in some cases of neurasthenia with manifestations of cardiac weakness, and, as Dietlen and Moritz⁶⁶ have shown, in some cases of syncope from overexertion. Of the two latter conditions, the primary condition may be a too rapid respiration washing the CO₂ out of the blood and thus giving rise to *acapnia* and underfilling of the heart.

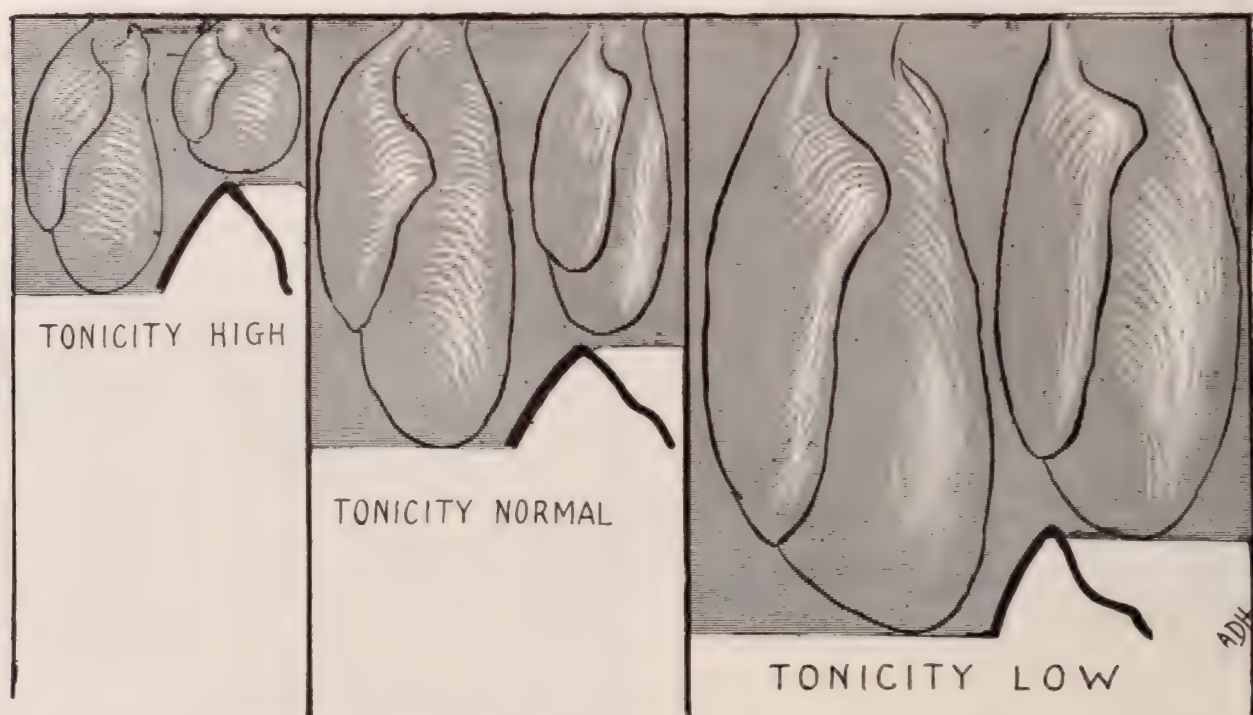


Fig. 23.—Diagram showing the condition of the heart with varying degrees of tonicity but with systolic output (amount of blood forced out per beat) normal. The volume at the end of diastole constitutes the index of tonicity which at the end of systole indicates the amount of residual blood.

The production of a simple irregularity by means of induction shocks brings on dilatation of the heart.

This question is at present in its infancy, but no doubt before long it will gain a very wide clinical importance.

We now come to consider what light a study of the volume curve can throw upon the work of the heart and upon the action of drugs. In order to do so, however, we must digress for a moment to consider the property known as the tonus of the heart muscle. *The tonus or tonicity of cardiac muscle is its tendency to resist overstretching during diastole, or in other words, its diastolic rigidity.* It is this tendency which keeps the heart from distending, and which antagonizes the effect of the venous pressure; and it is thus by virtue of the tonicity that the period of active filling of the ventricles ends and diastasis is enabled to set in.

When the venous pressure is constant, we may therefore measure the tonus quantitatively by determining the volume of the heart at the end of diastole. As you see upon the diagram, we may have a heart with a normal systolic output and a normal amount of residual blood remaining in the ventricle at the end of systole. This, I may add, is quite a considerable amount and varies greatly in different hearts and under different conditions. Now, we may also have a heart with a low tonicity which fills to a much greater degree than the normal heart. If this forces out the same amount of blood at each beat, you can readily see that a larger

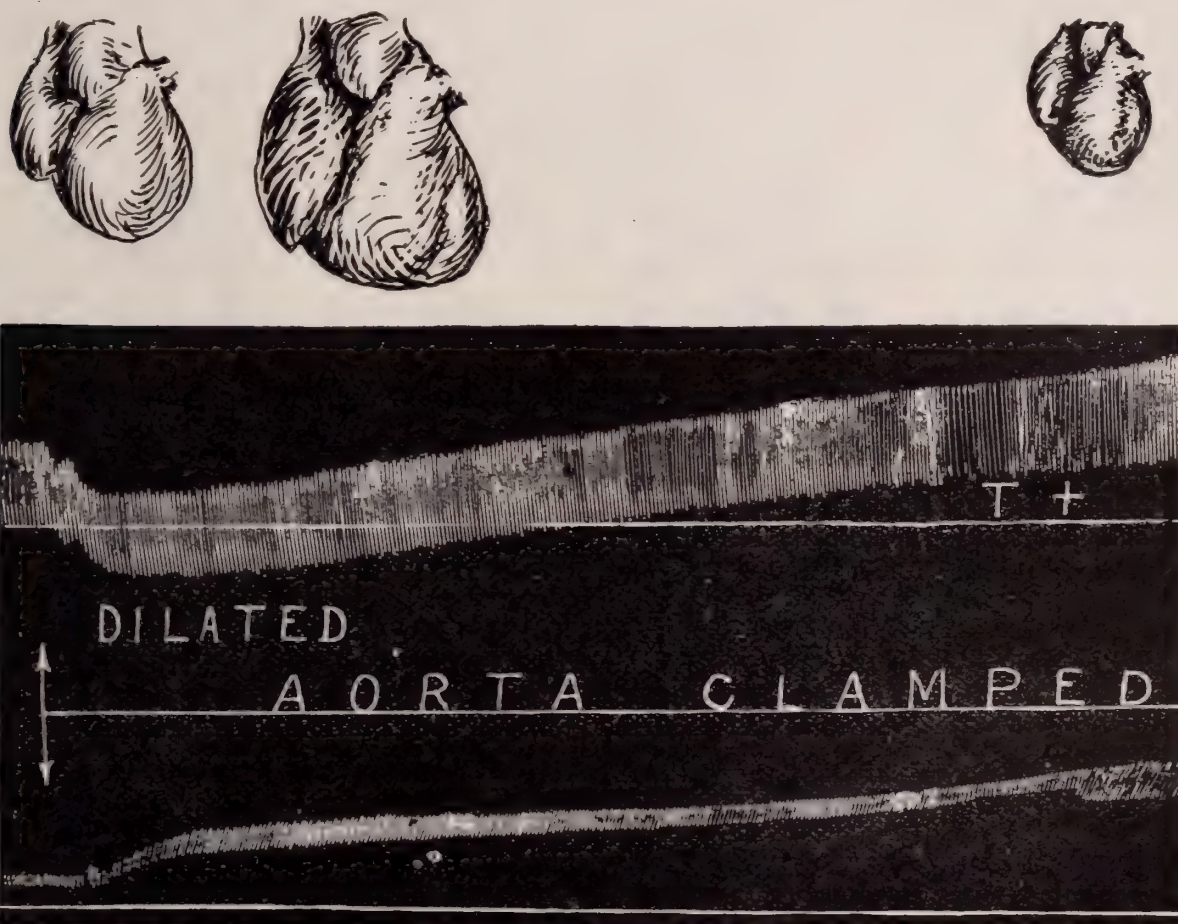


Fig. 24.—Effect of clamping the thoracic aorta upon the volume of the ventricles and upon the blood pressure in a dog with a strong heart whose tonicity is high. The volume of the heart after a momentary dilatation, gradually becomes smaller than before the clamping of the aorta. The relative size of the heart at each stage shown diagrammatically in the sketches above. These are drawn as in Fig. 2, and hence represent slight exaggerations of the actual appearance of the heart in these stages.

amount of residual blood will remain in at the end of systole, sometimes several times the amount put out at each beat. Such a heart with low tonicity may bail out this excess of residual blood by a larger output per beat; but if the tonus, the heart rate and the venous pressure remain unchanged, it will fill again to the same extent at each diastole. On the other hand, if the tonus is increased above the normal, less blood enters in diastole and with the same systolic output the heart bails out the residual blood until it contains much less than normal.

You see also from the curves that a heart with high tonicity fills more slowly than normal, while one with low tonicity fills more rapidly. In their effects a high tonicity and a low venous pressure are equivalent, and so are a low tonicity and a high venous pressure.

After this digression we shall now return to consider how these facts enable us to study overstrain of the heart. The effect of increased strain upon the heart may be studied by clamping the thoracic aorta. The effect which one then obtains depends upon the condition of the heart. If the heart is strong and the tonus of its walls is good, we obtain the effect shown by the tracing. The heart dilates for a moment under the strain, but soon the extra load begins to act as a stimulus to the ventricles, and they begin to pump out more blood at each systole. In a very short

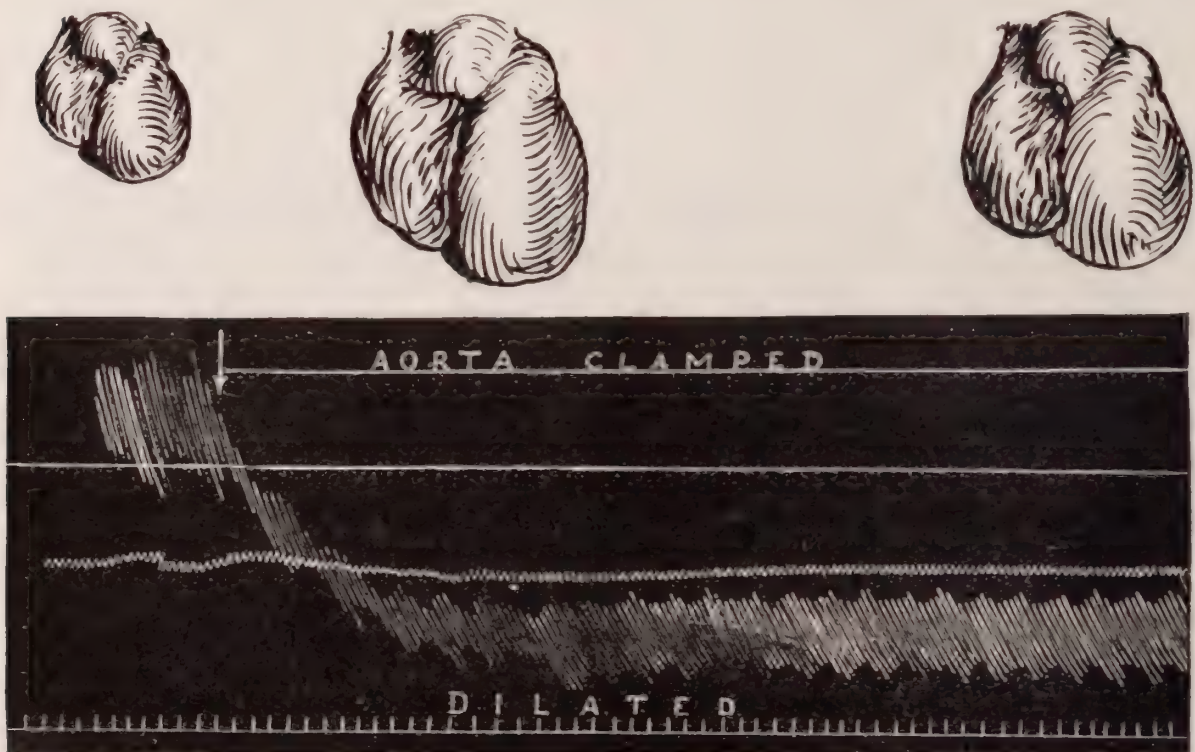


Fig. 25.—The same experiment performed upon a weak heart with low tonicity. The heart remains dilated throughout the strain. The blood-pressure at first rises, then falls.

time, as you see, the ventricles bail themselves out to the original volume, the systolic output and the tonus increase. Owing to these factors, however, the diminution in size of the ventricles continues. The residual blood is bailed out of the ventricles and does not re-accumulate, and, in spite of the continued strain, the ventricle becomes much smaller than it was before the strain was placed upon it. Indeed, in this particular heart the diminution in size continued to a much greater degree than is shown in this part of the tracing, until the lever actually kicked over the top of the smoked paper!

This experiment shows us two things: 1. This good strong heart which was capable of responding to strain, and which was of normal appearance at the beginning of the experiment, nevertheless, contained

residual blood which amounted to more than twice the output at each beat. 2. A mild strain upon a strong heart stimulates it, increases its tonus, and causes its volume to decrease just as a proper load serves to strengthen the contraction of a skeletal muscle. If the heart is just a little too weak, however, the same strain has a different effect. The next curve is taken from an animal with a weaker heart, and you will notice that here the strain diminishes the cardiac output and the tonus, and the heart remains dilated after the strain. This strain was distinctly harmful to this weaker heart, while in the case of the stronger heart the same strain was beneficial.

Fig. 26 shows the effect of a bicycle ride, from Leipzig to Strasburg, upon the heart of a trained rider.

Here we have illustrated the principles which are involved in all our gymnastic and hydrotherapeutic treatment in heart disease. A strain which is light stimulates the heart at once to stronger contractions and



Fig. 26.—Semischematic representation of the orthodiagraphic outline of the heart of a trained bicycle rider before, just after, and four weeks after a bicycle race from Leipzig to Frankfurt. (After Moritz and Dietlen.)

to improved tonicity; a strain which is too great, though perhaps only a little too great, weakens and dilates it. The border-line is easily crossed. It is this, too, that renders the exercise treatment and the bath treatment of heart disease a dangerous weapon. The exercise treatment depends upon the assumption that a more or less mild exercise will stimulate the heart to increased output and that it will improve the tonus of the heart muscle, just as we see clamping the aorta does it in the dog with the strong heart. Now this is the case if the heart is strong enough to stand any added strain. If it is not, the heart dilates just as we have seen in the other dog, and the dilatation may even go on to the point of complete heart failure and death. Most of us probably know of patients that were barely able to keep alive who have taken the Nauheim treatment and have died under it. The hearts of these patients were too weak and their tonus too low to respond to further strain, so that in them the exercise treatment had the exact opposite physiological effect from that for which it is indicated; whereas, the same treatment or any gentle, but less formal exercise might be quite beneficial to a stronger heart with more reserve force.

The CO₂ bath treatment gives rise almost to the same form of strain upon the heart as is produced by exercise. It stimulates the skin and causes the blood-vessels to relax, and also brings about an increase in the output of the heart at each beat. The blood-pressure may or may not be affected; it sometimes falls, but it often rises. Anyone, who has himself taken a Nauheim bath, realizes that it is almost as fatiguing as a mile walk, and should accordingly be used with great discretion.

Apparently that is the trouble with the Nauheim treatment as given at Nauheim and elsewhere. The physicians have become so hypnotized by the one idea or by the income which it has brought them, that they put all patients into one group, and thus violate all the physiological principles upon which their treatment is based.

Our experiment also throws some light upon another matter of clinical importance—namely, the so-called functional tests of cardiac efficiency. The most popular of these is Græupner's exercise test, in which it is found that the blood-pressure of strong hearts rises during exercise, while the blood-pressure of weak hearts falls. You will notice, however, in the curves (Figs. 24 and 25), that when strain is placed upon the heart—the strong heart as well as the weak heart—there is a rise of blood-pressure which lasts for a while in both, in spite of the fact that the hearts are dilating. In this particular weak heart the blood-pressure falls after a while. In many cases, however, the period during which the blood-pressure remains high in spite of dilatation is much more prolonged, so that from changes in blood-pressure alone one could not distinguish between the stronger and the weaker heart. The patient with a moderately weak, but not absolutely failing heart usually responds with a much greater rise of blood-pressure than does the normal individual. On the other hand, the athlete responds to mild exercise with a fall of pressure. The change of blood-pressure, therefore, gives no true index of the dilatation of the heart, nor of the degree of cardiac tonicity, and therefore, the mere blood-pressure and pulse-rate changes furnish evidence which is insufficient for the estimation of cardiac efficiency. The symptoms and sensations of the patient, his manner of breathing, his change of color, his general appearance, the degree of fatigue and many other signs, furnish a much more delicate test than the numerical changes in pulse rate or blood-pressure.

It is evidently of great importance to know the exact action of drugs upon the tonus of the heart muscle. The classical studies upon heart stimulants had taken into account only the action upon the blood-pressure, and with the exception of a few studies upon the frog's heart the changes in tonus had not been studied. For example, all the pharmacologists had stated that strychnine acts upon the vasomotor centre, but has no action upon the heart itself. Clinicians have, from time immemorial, been giving strychnine in order to increase the tonicity of

dilated hearts. Accordingly in 1907, I suggested to Dr. Cameron,⁶⁷ who was working upon his doctor's thesis for the University of Edinburgh in the Physiological Division of the Johns Hopkins Medical Laboratories,

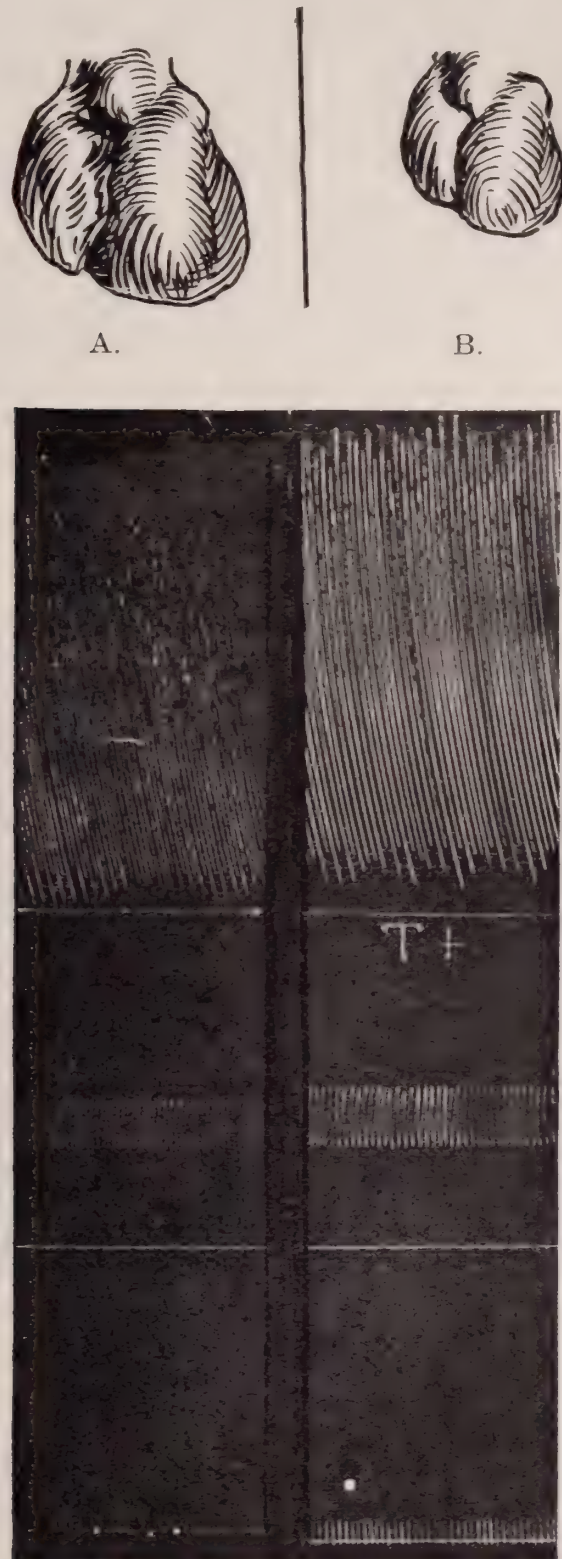


Fig. 27.—Effect of intravenous injection of strychnine upon the volume of the dog's ventricles. (Kindness of Dr. P. D. Cameron.) A. Before injection; B, after injection.

T+, tonicity increased. The sketches above indicate the size of the heart.

to test the effect of strychnine upon the volume of the dog's heart, especially using doses which were comparable to doses used by clinicians. Dr. Cameron found in a large series of experiments that strychnine, as

you see in the tracing, caused a diminution in the size of the heart, whether the output per beat were increased or not, and whether or not there was any appreciable change in maximal blood-pressure. In other words, strychnine does increase the tonus of the heart muscle; and it may be regarded as a direct heart stimulant and useful for dilated hearts. On the other hand, if Henderson is correct in his view that in shock the tonus of the heart is already too great, strychnine would be directly contraindicated in this condition, and indeed in all conditions associated with an underfilled heart. It is a little too early to take this view dogmatically; but we must remember that even Crile and Cushing regard strychnine as harmful in cases of severe shock in which they assume that the vasomotor centre is fatigued.

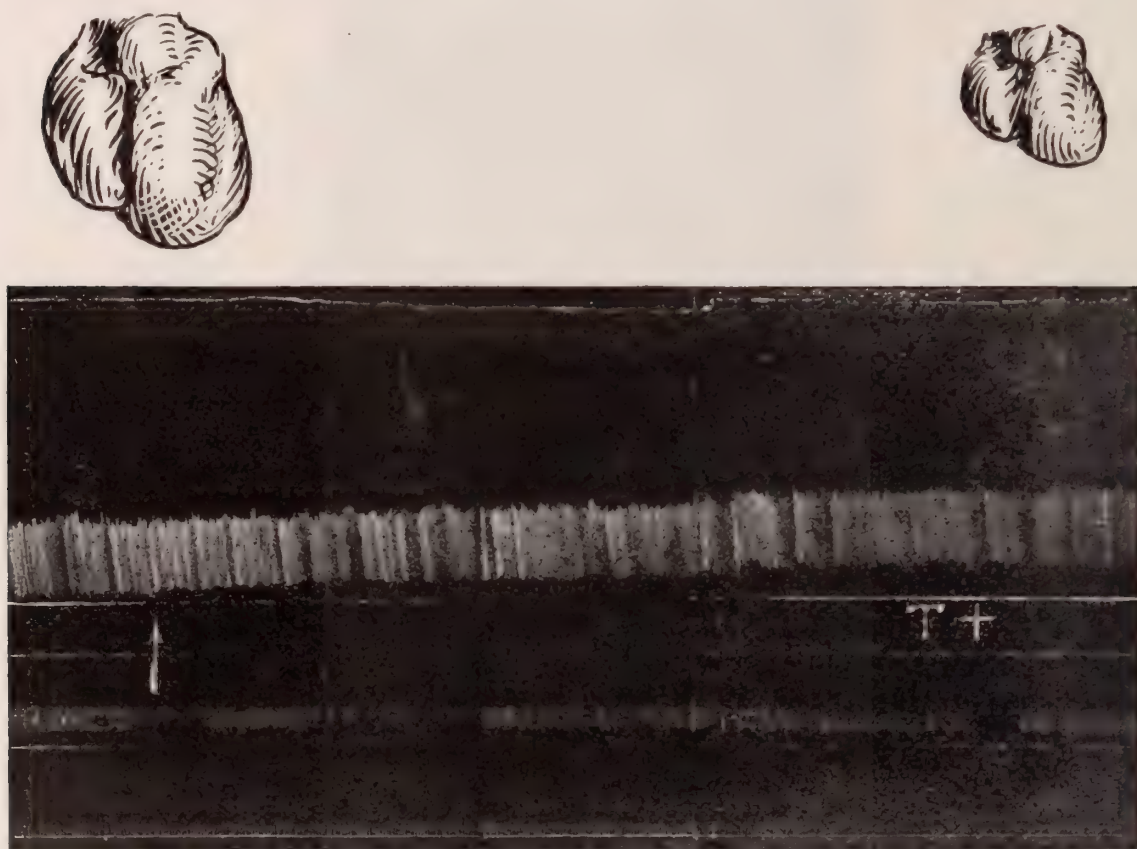


Fig. 28.—Diagram showing the effect of injection of digitalis upon the volume of the ventricles. (Kindness of Dr. P. D. Cameron.)

Digitalis injected at the point indicated by the arrow. +, tonicity increased.

The same action upon cardiac tonicity, which we have just shown for strychnine, is possessed also by digitalis and strophanthus to a much higher degree. All these drugs act by stimulating certain nerve fibres which run to the heart through the vagus, and which have a separate action in controlling tonicity. Hoffmann,⁶⁸ has found that in the frog these nerves exist as separate trunks, the so-called septal nerves which run from Remak's ganglion along the septum to Bidder's ganglion at the auriculoventricular ring. They thus reach the ventricle and stimulate it directly, cause an increase in its tonicity and strength of contraction. Dr. Cameron found that if the vagi are paralyzed with atropine, strychnine,

digitalis, and strophanthus, even calcium and potassium no longer cause any change in tonicity whatever. The combination of digitalis and atropine, which has been recommended by some clinicians, is therefore contraindicated.

Another condition in which a study of the volume curve has been of practical importance for treatment is aortic insufficiency. Ever since Corrigan,⁶⁹ in his classic paper in 1837 put the ban on the use of digitalis in aortic insufficiency for fear of promoting regurgitation by prolonging diastole, this drug has been viewed with suspicion and recommended with caution. In 1906, I suggested to Stewart⁷⁰ to study the pulse form and heart volume in experimental aortic insufficiency by means of the Henderson cardiometer; and much to our surprise we found that the important factors in determining the amount of regurgitation were not the rate

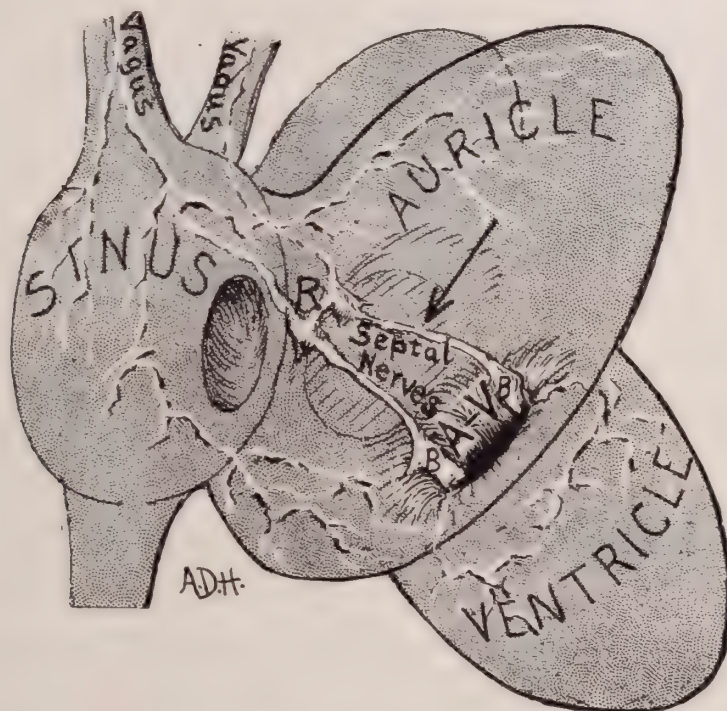


Fig. 29.—A diagram showing the course of the nerves in the frog's heart. The nerves over the sinus and auricle influence the rate, the nerves in the septum influence the tonicity and force of the ventricles.

R, Remak's sino-auricular ganglia.

B, Bidder's auriculoventricular ganglia.

A-V, auriculoventricular muscle.

of the heart, but the tonus of the heart muscle and the peripheral resistance of the arteries. We had expected that when the heart was slow it would dilate continuously throughout diastole, just as Corrigan supposed; but the tracings, as you see, show that when the heart is strong and the tonus high the filling becomes complete, even more rapidly than does the normal, and then no matter how long diastole continues no more blood enters. Indeed, if the tonus is high the regurgitant blood actually acts as a stimulus to the heart muscle, the tonus increases and the residual blood diminishes, so that the heart, after the production of the leak, is actually smaller than under normal conditions. However, if the tonus

is low or if the resistance is high, the heart does continue to fill throughout diastole and becomes dilated. Increasing the peripheral resistance, we found did under all circumstances increase the amount of regurgitation.

The question as to the usefulness or harmfulness of digitalis depends upon whether its action on the tonus of the muscle outweighs its tendency to constrict the blood-vessels, or whether the harm done by constriction of the vessels outweighs the advantage gained by increased tonicity. My own clinical experience leads me to believe that the advantage outweighs the disadvantage, and this view has been strengthened by a brilliant series of experiments by Cloetta.⁷¹ Cloetta showed that treating normal rabbits with digitalis for several months had no effect upon their hearts

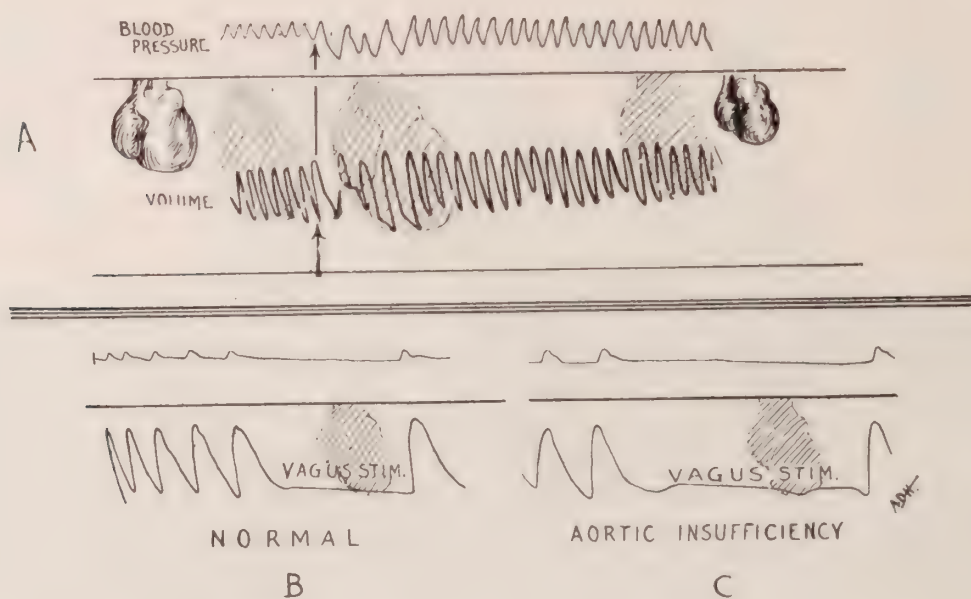


Fig. 30.—Effect of aortic insufficiency upon the volume of the ventricles (modified from Stewart, *Arch. Int. Med.*, 1908, I.).

A. Effect of producing an aortic insufficiency upon the heart of a very strong dog. Upper curve, blood-pressure, lower curve, volume curve of the ventricles. One of the aortic cusps was punctured at the point indicated by the arrow. The diastolic blood-pressure fell at once, the systolic remained unaltered. There was a momentary dilatation of the ventricles followed by a gradual diminution in size, as indicated by the sketches.

B. Volume curve of a normal heart under vagus stimulation, showing prolonged diastasis.

C. Volume curve from the same heart after the production of aortic insufficiency, showing the same result from vagus stimulation. The filling of the ventricle ceases as early as in the normal condition. The heart is very slightly more dilated than before the production of the lesion.

or vessels. He also produced aortic insufficiency in a large series of rabbits, treated one group and left the other group as controls. He found that the hearts of the treated rabbits were much more dilated and almost twice as much hypertrophied as the controls, and that the aortas of the controls were much more dilated than those of the treated rab-

bits. Moreover, the hearts of the treated rabbits were capable of much greater strain than were the controls. The digitalis had done good.*

However, in human aortic insufficiency, especially the arteriosclerotic type, we are confronted with an abnormally high peripheral resistance. It is advisable to lower this resistance as much as possible so that if one gives digitalis it is advisable to give the nitrites as well, especially sodium nitrite or small doses of erythrol tetranitrate.

The best substances of the digitalis series for acute failure are unquestionably strophanthin or ouabain, since they can be obtained in crystalline form and do not cause vaso-constriction. But we must never forget that strophanthus preparations must not be administered by mouth. Hatcher and Bailey,⁷² have shown that their absorption by the digestive tract is uncertain. When given by mouth one may fail to get any effect, or may suddenly get a toxic effect. Subcutaneous administration leads to pain and often abscess. Intravenous administration of a sterile solution is very satisfactory, especially in an emergency, but if a little gets outside of the vein it is painful. The best by far, in spite of some pain occasionally, is to give the drug deep into the muscle and massage for some time.

Dr. Cameron has found also that amyl nitrite and nitroglycerine have a direct action upon the heart and increase the tonus of the muscle and the systolic output. The latter effect has been found in man by Hewlett,⁷³ and by myself, so that both these drugs are of use in acute heart failure of aortic insufficiency. Indeed, in my experience they do more to relieve cardiac asthma of aortic insufficiency than any other drug. I may add that the same action on tonicity, that is in relieving dilatation, may account for the relief which they give in attacks of angina pectoris, particularly since Bond⁷⁴ in my laboratory has found that under ordinary circumstances they decrease rather than increase the flow through the coronary vessels.

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ON CHRONIC ENDOCARDITIS REGARDED AS A FIBROSIS
OF THE VALVES OF NON-INFECTIVE ORIGIN.

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In these days when bacteriology is dominant, if not indeed rampant, it is difficult to rid ourselves of the idea that fundamentally underlying one or other morbid condition of the tissues there is some primary microbic factor. Or perhaps, more accurately, our first inclination is to search after and seize upon evidences of present or past microbic activity, and, if we can find indications which with greater or less plausibility can be regarded as suggesting the outcome of microbic growth within the tissues, then we are satisfied to believe that we have grasped the etiology of the condition. If, on the other hand, we find ourselves compelled to fall back upon physical or metabolic factors as causes of tissue change, we do this with a certain distrust or discontent. For example, we have nowadays to accept such conditions as myxedema, acromegaly, Addison's disease, obesity, gout and acidosis as the resultants of disorders of the internal secretions or more broadly of cellular metabolism. But doing this, confessedly, it is difficult to form a mental picture of the succession of changes in the cells and tissues that lead to the anatomical manifestations of these different states. On the other hand, we have been drilled so thoroughly into an appreciation of the various stages which may result from an infective inflammation, and those stages, it may be added, are so many and so varied, that it is easy for us to imagine almost any morbid process as a resultant of some form of infection. Thus in the matter of valvular disorders—of endocarditis—I think I make a correct statement in saying that our tendency is to regard the valve changes as outcomes, whether recent or late, of some infective process, and, whether voluntarily or involuntarily, we find ourselves sceptical as to explanations of any other order.

Nevertheless, are we justified in considering chronic endocarditis as essentially of microbic origin? For myself, I must acknowledge that very early in my career a series of experiments by my old chief, the late Professor Roy, of Cambridge, published in our joint names, gave me food for thought. Among pathologists there has been no more brilliant mechanical genius than was Roy. His ability to devise instruments fitted to give records of one or other order was extraordinary. He devised and I noted. And incidentally in the course of our studies upon the effects of increased arterial pressure upon the volume and work of the dog's heart we found, that increased aortic pressure, produced by narrow-

ing the aorta was repeatedly followed by very definite changes in the aortic valves. These, we found, were not mere inert mechanical membranes, but reacted to their environment. The aortic cusps, it may be recalled, are normally devoid of vessels save near their bases. Their nourishment therefore is by means of blood plasma absorbed through or between the lining endothelial cells, or both, from the cardio-aortic blood. After extreme high pressure in the first part of the aorta we found that the cusps presented a series or chaplet of fine glistening bead-like elevations just below the line of their apposition. Evidently during diastole the high pressure acting upon their aortic aspect coupled with the low pressure on their ventricular aspect, and it may also be with expansion of the endothelial cells and increase in the intercellular spaces due to stretching of the cusps under the increased pressure; all these have led an increased percolation of "lymph" into the valve substance with a collection of the same along the line of greatest strain or weakness of the cusps. And Roy and I then called attention to the possibility that the thickening of the aortic valves in cases characterized by high blood-pressure might be a later outcome of this same process.

Now chronic endocarditis in elderly people is characteristically associated with the presence of nodose arteriosclerosis, and the two processes are, I would point out, of identical type. Both conditions involve intimal structures, (for the heart valves are but infoldings of the cardiac intima), and, histologically, they are of the same order, with overgrowth of the subendothelial connective tissue, the most recent layers being nearest the surface, the deeper layers exhibiting a series of degenerative changes which culminate in the development of calcareous plaques. I freely admit that in one order of arteriosclerotic changes a proliferation and swelling of the cells of the musculo-elastic layer immediately to the inner side of the internal elastic lamina is a prominent feature. In the cases that I here refer to these changes while they may be present are not dominant. What is especially significant is this laying down in an orderly manner of layer after layer of connective tissue parallel to the surface, whether of aorta or of aortic cusp. There are here none of the cardinal signs of inflammation or its after results; no accumulation of leucocytes or plasma cells, no entry and no formation of new vessels, such as we see, for instance, after the chronic inflammation of other non-vascular regions, as the cornea. As my old colleague, Professor Klotz, has demonstrated (although he does not see eye to eye with me in the explanation of these changes) a similar uniform connective-tissue hypertrophy with accompanying overgrowth of the musculo-elastic layer can be produced in the rabbit by purely mechanical means, namely, by periodical raising of the blood-pressure for a few minutes every day extending over several months. In the absence, therefore, of adequate evidence of infective origin in these cases, in the absence of signs of ordinary inflammation and from the histological features of the new tissue, it is neces-

sary to look for some other non-microbic, causative agent in the production of these two conditions, and I cannot but conclude that in both we deal with stress or perhaps, more accurately, strain upon the affected part, coupled with adequate, or indeed increased nutrition; I say *strain* rather than *stress*, regarding the latter as the normal condition to which the vessels are normally and periodically subjected. *Strain* I regard as a more abnormal pathological condition leading to one order of conditions of the nature of increased reaction, and *overstrain* as a still more aggravated condition having, however, results of a different nature—namely, to absence of reaction. What seems to me characteristic of all the conditions, here referred to, of valves and arteries is that either we have clinical indications that the tissues are already weakened, so that what under normal conditions would be a stress, now becomes a strain (where it does not become an overstrain), or, on the other hand, that the tissues in the intima are in their normal state, but are subjected to increased blood-pressure, to an actual rather than a relative strain.

There is, it may be laid down, a normal environment for the cells of every tissue under which those cells attain unto a certain limit of growth and do not exceed this limit so long as environment remains unchanged, but, at the same time, it has to be recognized that even such inert tissues as bone show us clearly an increased growth under conditions of moderate increase of the work they are called upon to perform. For example, increased muscular exercise demonstrably leads to increased weight and size of the skeletal bones, and development of their bony ridges where these muscles are inserted. And so with the intima of the aortic cusp: subject this to a moderate strain and it undergoes thickening. The prettiest example of this that I have come across has been in three cases of functional incompetence of the aortic valve, through widening of the aortic ring. All three of these cases were relatively early; under the hydrostatic test each exhibited a roughly-triangular orifice where the three corpora Arantii did not meet, and it was very striking to notice that just at this region the edge of each cusp had undergone thickening and rounding, with distinct fibrosis. The cause here was purely mechanical; just those portions of the cusp that did not come into apposition were subjected to the greatest strain, and, as a consequence, the cells had proliferated and produced increased fibrous tissue.

But it may be objected that in the case of the mitral valve, for example, in the typical endocarditis of the young individual, due to rheumatism, we have evidence of the same fibroid thickening of the valve which is of undoubted microbic origin, since everyone nowadays either believes, or is prepared to believe, in the infective nature of acute rheumatism.

It is quite true that these cases so far as we can follow them, (where death occurs in the acute condition), begin with indications of a true inflammation, with destruction of the endothelium, formation of vege-

tations, as also vascularization of the valve. The early stages here are identical to all intents and purposes with those following upon an acute microbic ulceration of the cornea.

Now I wholly admit this infective origin of these mitral cases and, indeed, also of a certain proportion of cases of aortic endocarditis. I would only urge, however, that *the progressive thickening and contraction of the mitral valve is an interval occurrence, and is not directly due to the microbic irritation.* I am inclined to believe, that whether by the deformity of the valve produced in the region of actual ulceration, or merely through the focal growth of the micro-organisms, the valve becomes weakened and no longer functions so perfectly as before; and, as a consequence, is subjected to a relative strain. In a certain proportion also of these cases there are indications of increased blood-pressure and actual, rather than relative, strain upon the cusps. Thus it is this secondary strain that is responsible for the diffuse and generalized mitral thickening seen in these cases, rather than the primary irritant—the cause of acute rheumatism.

We have here another example to add to the abundant instances of the existence of "Vicious Circles" recently accumulated by Dr. J. B. Hurry.* Whether from extrinsic or intrinsic causes, the cusps become subjected to strain, and reacting, there is tissue growth with thickening and fibrosis. This very thickening makes them function less perfectly, and as a result they are subjected to more strain. More strain leads to further fibrosis—and so progressively there are developed those conditions of extreme diffuse thickening, contraction, deformity and degeneration of the heart-valves, with which we are so familiar. Here, indeed, Ossa is piled on Pelion, for the incompetency of the fibrosed valves leads to hypertrophy of the ventricular muscle in order that the circulation may be preserved. This hypertrophy results in more powerful contraction, with resultant heightened intracardiac pressure. The forces thus acting upon the damaged valves and inducing strain are not constant, but exhibit progressive augmentation. There is no "let up" to the process until the strain on the heart walls gives place to overstrain and cardiac failure is the result.

*Vicious Circles in Disease. J. and A. Churchill, London, 1911.

DISPLACEMENTS OF THE HEART AND DIAPHRAGM TO-
GETHER WITH DISTURBANCES IN THE FUNCTION OF
THE LATTER AS CAUSES OF SYMPTOMS
IN PULMONARY TUBERCULOSIS.

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Much has been written regarding the various organic heart lesions in their relation to tuberculosis; the subject of the relatively small heart has been thoroughly discussed; the question of toxic degeneration of the heart-muscle has received some consideration; but there are certain other conditions referable to the circulatory system in tuberculosis, which, though usually present, have received scant attention heretofore. I refer to the various displacements of the heart and the displacements and altered function of the diaphragm.

It is somewhat surprising that these conditions have not received more attention from clinicians when we consider the fact that they are present and produce symptoms in nearly all patients who are suffering from tuberculosis. There are displacements of the heart in some form and to some degree in all cases where either a lessening or increase in the volume of the lungs occurs. The function of the diaphragm is interfered with from the very beginning of tuberculosis. It is displaced either upwards or downwards in nearly all patients who go on to an advanced stage of the disease, the dislocation depending upon the inter-relationship between the intra-abdominal and intrathoracic pressures.

The symptoms which result from these conditions can only be understood in connection with the physiology of the heart and diaphragm. The heart is normally placed in the thoracic cavity in a position which enables it to perform its function with ease. The circulation of the blood is aided by every normal respiration. Any condition which changes the position of the heart, putting it in a position less favorable to action, and any condition which interferes with full and free respiratory movements, therefore interferes with the circulation of the blood. The diaphragm is considered the chief muscle of respiration. It is also an important aid to circulation. It is aided in its action by the abdominal muscles.

The normal contraction of the diaphragm acts by forcing the abdominal viscera downwards and forwards, increasing the anteroposterior and lateral diameters of the abdomen and lower thoracic cavity, and at the same time increasing the thoracic space and decreasing the abdominal space from above downwards, thus reducing the abdominal space and increas-

ing the thoracic space as a whole. It can be seen that the abdominal muscles must play an important part in this action. Their tension is increased by the contraction of the diaphragm, and we assume that their recoil is a part in the expiratory act; in fact, it seems probable that this recoil is not wholly passive.

This increased space in the thoracic cavity allows an inrush of air into the lungs and at the same time dilates the heart and favors the return flow of blood from the large veins into the right auricle. This pump-like action upon the large veins is the greater the freer the respiratory action. Not only is there an increased suction action favoring the return flow through the *venæ cavæ*, but, in the abdomen, there is a positive force exerted by the contracting diaphragm pressing upon the abdominal viscera and squeezing the blood out of them and forcing it into the larger veins and favoring its flow on to the heart. The natural result of the conditions which I am considering, then, is to make the work of the heart more difficult and to cause an accumulation of blood in the abdominal viscera. We will discuss the more definite results as we proceed.

The heart and the diaphragm are so closely associated that we can hardly conceive of a displacement of one without the displacement of the other, except within certain narrow limitations afforded by a pericardium sufficiently large to permit the heart to move from side to side, as the body assumes different positions.

The symptoms and end results produced by the displacements of the heart and the disturbances in the function of the diaphragm are different. The ultimate effect of the displacement of the heart *per se* is more serious than that of displacement of the diaphragm, although a displacement of the diaphragm probably produces the greater number of symptoms, most of which are of a cardioneurotic nature.

The displacement of the heart also causes many cardioneurotic symptoms, but what is more serious, it leads to organic changes.

The effect resulting from destruction of tissue and contraction of the upper lobe of the left lung is to draw the heart upwards and to the left. Not only is the heart thrown out of its normal position and forced to work at a disadvantage because of this, but the probabilities are that the outlines of the pericardium are changed so that the pericardial space is somewhat reduced. The altered position causes the heart to drag on the large vessels, produces a decrease in the curve of the arch of the aorta, thus bringing about a condition which interferes with the free flow of blood into the systemic arteries. The same dragging effect is exerted on the other vessels pulling the large veins out of their normal course and interfering with the return flow of blood to the right heart.

If the destruction of tissue and contraction occurs in the upper lobe of the right lung, the heart is drawn upward and to the right. The curve in the arch of the aorta is increased and pouching is favored. The heart

is again thrown out of its normal position and the venæ cavæ and other intrathoracic vessels are drawn from their regular course; and, again, obstacles to filling and emptying the heart are encountered.

If the heart hangs low in the chest it increases the distance from the apex to the large vessels, and thus the heart drags upon them, producing disturbances in its function.

If the heart is displaced directly upwards, the result is a shortening of the distance between the apex and the large vessels which tend to produce a pouching of the aorta. This is apt to occur when both apices are the seat of destructive change followed by contraction; this, however, rarely occurs.

In order to overcome the extra pressure in the circulation in the pulmonary system, the right heart has already hypertrophied and now the left ventricle is compelled to hypertrophy in order to overcome the extra burden thrown upon it by the heart's displacement and the changes in the aorta and general arterial system. In this connection I would like to call attention to the changes which occur throughout the arterial system as a result of the toxins in tuberculosis. In a former paper¹ I reported the results of examination of one hundred and sixty-two tuberculous patients. Of these, the arteries were palpable in ninety-four instances. Of ninety-three of these who gave a history of illness lasting more than two years, the radials were palpable in sixty instances. From my study I drew the conclusions that a thickening of the arteries takes place in chronic tuberculosis as a result of the prolonged action of the toxins. Since writing this paper I have made further observations which fully substantiate the results there reported. A short time ago a young girl came under my care who had been suffering from pulmonary tuberculosis for two years. The disease had not taken a very active form, although percussion dulness and physical signs extended to the third rib on the right. Although she was only eleven years old, her radials were distinctly palpable. When we consider the changes which I have mentioned in the aorta, the thickening of the peripheral arteries, the displacements of the heart which cause it to work at a disadvantage, and the fact that the heart-muscle early undergoes pathological change, we can see that the end result must of necessity be degeneration.

The cause of death in nearly all tuberculous patients is of cardiac origin. It can be seen that these dislocations interfere with the easy working of the heart and throw extra burdens upon it, all of which have a tendency to cripple its working ability and cause degeneration.

The immediate symptoms produced by displacements of the heart are those of cardiac embarrassment. I have had the opportunity of studying several hearts where the displacement occurred quickly, owing to the rapid destruction of tissue in the neighborhood of its borders. In one case the heart moved more than one inch to the right within a few days' time, owing to the formation of a large cavity in the right lung near

the heart border. In all cases which I have watched, the symptoms were those of extreme weakness, shortness of breath, rapid heart action and tendency to syncope, loss of appetite and nausea, especially if the patient changed his position. Where the heart moves more slowly the symptoms, of course, are not so marked. The main ones of which the patient complains are those of rapid heart action and shortness of breath upon exertion.

The symptoms produced by high and low position of the diaphragm have been carefully described by Wenckebach.² Arterial anemia and venous congestion, especially in the splanchnic area, are quite pronounced. These patients appear pale, although if the blood is examined there is little or no anemia present. This is one of the particular characteristics of the tuberculous patient, and I do not doubt that these anemic appearances, in many instances, are due to this arterial anemia produced by the altered function of the diaphragm. The pulse is small and usually rapid, the patients suffer from shortness of breath and a general lack of nutrition. They often suffer from palpitation and feel faint. Their extremities are often cold. This disturbed function of the diaphragm is unquestionably another factor in the low blood-pressure of the tuberculous patient. Disturbance of function, on the part of the abdominal viscera, such as altered gastric secretion, constipation, diarrhea, colitis and flatulence are very common. One thing which I have noted regarding these abdominal conditions is that they not only seem to be much more frequent in the class of patients which I am now describing than in other individuals, but they also seem to be more serious and more difficult to relieve. I consider this due partly to the chronic venous congestion resulting from the altered position of the diaphragm.

Another feature which is present in most cases is an unstable condition on the part of the nervous system. While there is always some neurasthenia present in patients suffering from tuberculosis because of the toxins liberated by the tubercle bacilli, yet in these cases of severe disturbance, on the part of the diaphragm, there is a neurasthenia which is more pronounced and more difficult to relieve than that found in the tuberculous patient where these conditions are absent or present to a lesser degree.

The hypotension found in those suffering from pulmonary tuberculosis is probably a result of several factors. The fact that it has been noted to a slight extent in early cases has been used as an argument in favor of the toxin theory of its origin. It must be recalled, however, that the interferences in the function of the diaphragm also appear early in tuberculosis and favor hypotension by interfering with the return flow of blood to the heart, thereby producing a venous congestion and a relative arterial anemia. In some instances, this action is scarcely felt in the early stage of the disease. In others it is more pronounced. As the disease advances, however, the disturbance in the function of the diaphragm becomes

greater, and changes in the position of the heart, as well as in the muscle itself, take place, all of which favor hypotension. While the toxins are probably the greater factor in the production of hypotension in incipient tuberculosis, in the advanced stages of the disease they must take a place secondary to the mechanical causes which manifest themselves on the part of the circulatory system. The pulse in advanced tuberculosis, where the heart is fully competent, is not far from normal in its rate as long as the patient remains at rest, or even under light exercise; but, if more strenuous exercise is engaged in, then the heart shows signs of being overworked. The pulse increases to a greater rate than would be normal for the amount of work done, and fails to return to the normal limits within a time which would be considered normal for a healthy heart.

There is also another large class of tuberculous patients whose hearts are fully competent so long as they remain at rest; but, who, as soon as they undertake exercise, suffer from heart embarrassment, the pulse becoming rapid, dyspnea appearing, the patient feeling weak, and sometimes, in severe cases, dizzy and faint. As long as the patient is at rest the functions of the body are carried on economically, the minimum amount of oxygen is required to produce satisfactory aëration of the blood; but, when exertion is attempted, a greater amount of oxygenated blood is called for than the heart can supply. The heart can no longer measure up to the increased work that is thrown upon it. It has been estimated that the flow of blood is four or five times as rapid in active muscle as in resting muscle; that rising to a position ready for walking from the resting position doubles the amount of oxygen required by the tissues; and that starting to walk quadruples it. The heart, in its weakened condition, working under the disadvantage of displacement, together with the changes in the arteries and the relatively large amount of blood in the veins, causing a relatively small amount of blood to be discharged at each systole, is unable to meet these circulatory requirements.

It can thus be seen that, if the functions of the body are to be carried on normally, the circulatory system must not be seriously interfered with, the blood must be forced through the lungs in sufficient volume and with sufficient rapidity to provide the oxygen required to carry them on. In advanced tuberculosis, however, we have conditions which are especially difficult to overcome. Besides the reduction in the capacity of the lungs themselves, we have conditions on the part of the heart and circulatory system which make it extremely difficult for the circulation to be maintained in a manner capable of providing the oxygen which is required by any extra amount of exertion; hence the symptoms of cardiac embarrassment so frequently found.

It is necessary now to discuss more clearly the causes of these conditions. The displacement of the heart and diaphragm is due to loss of tissue and the resulting compensations on the part of other tissues. The

disturbance in function of the diaphragm, however, is probably of reflex origin.

The lessened motion of the diaphragm on the affected side was pointed out by Williams,² as being an early sign of tuberculosis. He determined the phenomenon by use of the *x*-ray. Its explanation has not been wholly clear. De la Camp has suggested that it is due to the phrenic nerves being bound down in pleural adhesions at the pulmonary apex. Hofbauer and Holzknecht have suggested that it is caused by a decreased

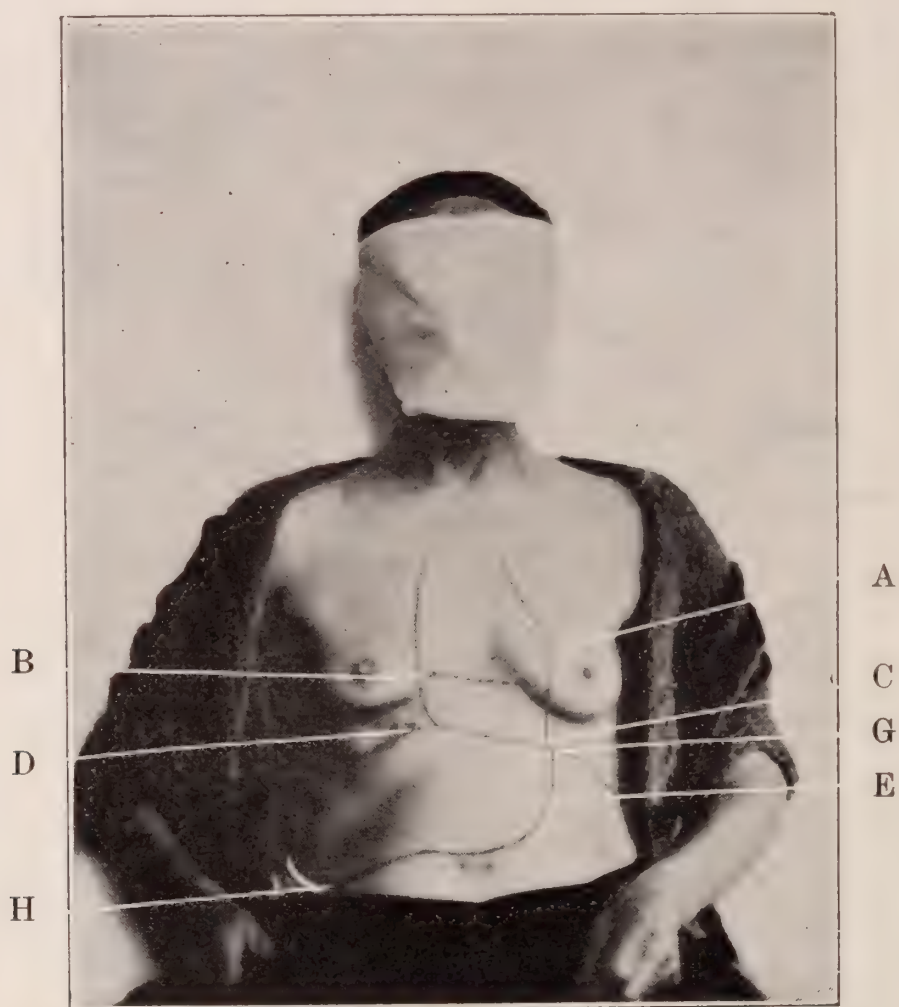


Fig. 1.—Showing the low position of the diaphragm, heart and liver. The broken line BA marks the xipho-sternal angle, which is normally in such shaped chests as this, on a line with the lower borders of the heart. DE represents the lower border of the heart; BDCE, the diaphragm and GH, the lower border of the liver. This picture was taken after patient had been treated by adhesive straps and had gained about fifteen pounds in weight. Thus the liver is higher than mentioned in the text.

elasticity in that portion of the lung which is involved and by a relaxation of the remaining tissue, thus causing a general lessening of the contractile power of the lung as a whole. My recent studies convince me that the phenomenon is of reflex origin. The phrenic nerve is given off from the third and fourth or fourth and fifth cervical roots. This is the portion of the cord, which receives the impulses from the lungs through the sympathetic nerves; and the limited motion of the diaphragm is

accounted for in the same manner as the contraction of the neck and chest muscles, as described by Pottenger,⁴ viz., a reflex stimulation, the impulse traveling from the inflamed lung through the sympathetic nerves to the cord, there stimulating the adjacent cells in the same segment of the cord, and causing impulses to be sent out through the fibres of the motor nerve or nerves arising in the same segment, to the muscles, which cause them to assume a state of tonic contraction. With this explanation it can be seen that the function of the diaphragm is interfered with early in tuberculosis, and that the interference must keep up throughout the disease.*

We recognize other factors in tuberculosis which interfere with the normal action of the diaphragm. Among the most common are emphysema, pleural effusions and adhesions, contraction of the lungs and displacement of the heart and mediastinum above the diaphragm and loss or increase of tissue and flatulence below the diaphragm; but, while these are sometimes present, the effect of the reflex stimulation through the phrenic nerves is always present. The diaphragm assumes a high or low position according to whether the pulmonary space decreases or increases. When a severe destructive process develops in one or both lobes, as it often does in the upper lobes, and this is followed by marked contraction, the diaphragm is apt to assume a higher position than normal. Where, on the other hand, the disease develops slowly, and through continuous coughing extending probably over years, an emphysema develops, we find the diaphragm low, and a condition of general visceroptosis present.

The abnormal positions of the heart and diaphragm can be studied by the use of the x-rays, although the ordinary methods of physical examination, when carefully applied, are sufficient for detecting them. In our teachings upon the location of the heart within the thoracic cavity we have probably failed to make it clear that there is a natural variation in the position of the heart depending upon the shape of the thorax. We must not expect the apex, base and lateral borders to occupy the same relative positions, with reference to the surface landmarks, in a very narrow, long chest, as in a short, wide chest. This is important in studying the conditions before us. If we accept the rule that a line drawn from the articulation of the xiphoid appendix to the tip of the eighth thoracic spine should touch the dome of the diaphragm and thus be on a level with the under surface of the heart, we will find many exceptions to it in the long chests of tuberculous patients, even when examined before changes have occurred which cause the heart to assume a lower position. Hirschfelder⁵ considers this pathological, and suggests a line of treatment for its correction; but I cannot believe that it should be considered so. It seems to me normal for that type of chest, and as long as the diaphragm is functioning normally and in the natural

*These problems have been discussed quite thoroughly elsewhere and will soon be published in Brauer's *Beiträge zur Tuberkulose*.

relationship with the organs lying above and below it, it seems but natural to consider the condition as normal. When the heart hangs low, the horizontal diameter is decreased because the apex has dropped and the transverse diameter represents a section more nearly perpendicular to the long axis of the heart than that where the heart is in its normal position. The superior dulness of the heart is also lower than normal, being often below the third rib. When very low the right ventricle may be seen to pulsate in the epigastrium.

The following is the most extreme case of low diaphragm and general visceroptosis that I have detected among my tuberculous patients. Figure (1) shows a photograph of the outlines of the organs as made by me. Mrs. L., aged fifty-eight. Always a hard worker. Had hemorrhage ten years ago and had coughed during the winters ever since. For the past two years had never been free from cough. Expectoration contains bacilli. Has had more or less stomach trouble for the last ten years. About two years ago began having pains in the epigastrium and showed signs of loss of endurance and sensations of weakness with rapid pulse and some dyspnea on exertion. *Physical examination.*—Tuberculous infiltration in upper portion of both lungs, remaining portions emphysematous. Lower margin of lungs reaching inferior margin of throat; the eighth rib in mid-clavicular line and twelfth vertebra posteriorly. The abdominal organs were all low, the right kidney was in the right anterior lumbar region. The liver had fallen away from the under surface of the diaphragm and scarcely moved on inspiration. Its lower border was one inch below the umbilicus. The lower portion of the thorax sank in at each inspiration showing the *typus paradoxus*. The pulsation of the heart was plainly visible in the epigastrium; the apex beat was under the seventh rib slightly nearer the sternum than normal; the point of maximum intensity for the pulmonary and aortic valves was in the third interspace. Pulsus paradoxus was present. Aside from the chronic cough and emphysema this patient had very flabby abdominal muscles, which also favored this general visceroptosis. This is characteristic of the type of chronic coughers with emphysema which I have described above, although the degree of ptosis is extreme.

When the heart is displaced upwards, its transverse diameter is increased. This is especially true when the displacement is toward the left. If the apex beat can be found, it is an important aid; but very often in advanced tuberculosis it cannot be detected. I would like to call attention, especially, to the fact that the point of maximum impulse is not always the apex; for often the impulse is due to the enlarged right ventricle, the left ventricle having been pushed backwards away from the chest wall. As an example of high positions of the diaphragm and upward displacement of the heart, I would like to cite the following case:—Miss S., aged twenty-two. Ill three years of pulmonary tuberculosis, now in state of arrest. Upper lobe of left lung seat of cavity

formation and marked contraction, the lower borders of the lung being drawn up to the fifth rib in the mammary line. Right lung shows compensatory emphysema extending beyond the medium line to the left. The diaphragm on the left is high. The heart is drawn to the left, the apex being in the fourth interspace to the left of the nipple line, the right border at the right border of the sternum. The base of the heart is also pushed upwards and to the left. The patient shows arterial anemia, being pale. Has very little endurance, rapid heart, dyspnea on exertion, cold extremities, at times feels dizzy and on several occasions has almost fainted.

The important thing to know is that these conditions produce symptoms which are often very annoying. They are often thought to be indicative of serious heart lesions. Fortunately, they can be relieved to a large degree, if recognized, by the application of suitable abdominal binders. Not only are the cardioneurotic symptoms, just mentioned, relieved by proper abdominal support, but oftentimes intractable symptoms on the part of the gastro-intestinal tract, such as indigestion, constipation, diarrhea, colitis and flatulence are relieved only after the organs are held up by proper binder. When we realize the importance of good heart action, a stable nervous system and good digestion in tuberculosis, the importance of looking for and correcting these conditions can be appreciated.

The symptoms arising from the various displacements of the heart are not so readily relieved, for the heart cannot be replaced except in those instances where it is displaced downwards. The organ, when once displaced, is compelled to continue its work at a disadvantage. In those instances, however, where the change is slight, the symptoms are negligible. Where it is greater the symptoms are more marked; but the most that we, as physicians, can do is to shield the heart as much as possible from overstrain.

Heart and diaphragm displacement and alteration in the function of the diaphragm are found to some degree as previously mentioned, in practically all patients suffering from tuberculosis. Of course, the disturbances are greater in the advanced cases. Physicians who are treating advanced cases should be on the watch for the symptoms referable to these conditions, and should not allow themselves to be deceived into thinking them an indication of the more serious heart lesions. A correct understanding of them will be of untold value to the patient, and will relieve the physician of much unnecessary anxiety.

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THE USE OF RÖENTGEN RAYS FOR EXAMINING THE HEART.

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If, at the kind request of the editor, I here endeavor to describe what services can be rendered by Röntgen rays when examining the heart, it can of course only be in the briefest outline without any claim to completeness. Especially as to the technical details which I cannot discuss fully here, I shall have to content myself with referring, when necessary, to the literature bearing upon the subject.

Generally speaking, x -rays are used for the following purposes when examining the heart:—

1. Observing the action of the heart.
2. Determining the position of the heart.
3. Ascertaining the form of the heart.
4. Defining the size of the heart.

However, to decide whether, in any individual case, there has been any pathological change in one of these four points is only possible, when we have an exact knowledge of the normal condition of the Röntgen shadow. In the following, therefore, I will give a description of the normal condition before proceeding to the pathological state.

The action of the heart is observed by means of the screen. If we choose the sagittal direction of the rays—passing through the body from back to front (dorsoventral), or vice versa (ventrodorsal), we see the dark medium shadow bounded on the right and left by the light shadow of the lungs, pulsating gently in the two lower thirds. The character of these movements shows slight variations in different places on the margin, which make it possible to draw conclusions as to the section which produces the movements.

The so-called “medium shadow” is formed by different organs casting Röntgen shadows. Besides the spinal column and the sternum, this is done chiefly by the heart and the great vessels. In a normal condition the shadow of the heart and the large vessels overlaps the other parts everywhere, both to the right and to the left, being clearly outlined in curves against the light shadow of the lungs. To the right we see two curves, the right lower one, the curve of the auricle, and the right upper one, the curve of the large vessels. To the left we see four curves, the left lower one, the curve of the left ventricle, adjoining that of the left

auricle (in normal conditions formed only by the appendix of the left auricle), then farther up the curve of the pulmonary artery, and last of all the curve of the aorta. The exact definition of these curved outlines has given rise to many controversial papers which, however, it will be impossible for me to discuss here. In the clearing up of this question studies on the corpse and above all the observing of the pulsation have shown the following results:—

The right lower curve evinces but a slight and gentle pulsation and is presystolic compared with the apex-beat. The right upper curve, in the extremely rare cases when the veins form the outline, does not show any pulsation at all, whereas in most cases, the aorta forming the outlines, a slight pulsation may be detected alternating with that of the lower curve. On the left side we see a kind of undulating movement, which we can best describe as vermiform. The contraction of the lower left curve corresponds, as is shown by palpation, with the apex-beat. On the curve of the aorta we see a stronger pulsation, a somewhat slighter one on the curve of the pulmonary artery. If the curve of the left auricle is distinctly marked, we see its contractions preceding those of the left lower curve of the ventricle. The movements of the auricle are rapid and convulsive, those of the left ventricle pumping and more copious, those of the vessels slight and sluggish. We can, moreover, generally distinguish both a feeble and a stronger type of action.

In this latter point it is not always easy to draw a line pathologically. In cases of chlorosis, chronic tuberculosis, etc., we often find an abnormally feeble type of action; with nervous people, especially those suffering from neurasthenia, a decidedly more vigorous type of action. The same vigorous form of pulsation is likewise discernible in cases of aortic insufficiency, bradycardia and heart-block; an abnormally feeble pulsation in cases of myocarditis. With tachycardia paroxysmalis we have the impression of a vibrating, more or less irregular movement, whilst with the Basedow-patients there is a more vigorous pulsation of the heart, notwithstanding an increased rapidity of movement.

Variations in the marginal curves from the normal type of pulsation occur with different diseases of the heart; for example, very vigorous pulsatory movements of the curve of the pulmonary artery in cases of persistent ductus Botalli. The same thing is to be seen in the rare cases of perforation of an aneurysm in the pulmonary artery, as well as with congestion in the lungs. If the intraventricular septum is deficient, we can see ventricular movements of the right lower curve. In affections of the mitral valves, especially in mitral stenosis, a violent pulsation of the auricle is usually to be observed. In cases of tricuspid incompetence there is a pulsatory movement of the superior vena cava, which then forms the outline. F. Kraus and Hofmann-Duesseldorf have, moreover, shown that roentgenoscopy can also be employed for examining the reference of the pulse to the cardiac action; for example, to decide

whether an intermission of the pulse corresponds with an intermission of the heart. The question whether the patient is suffering from heart-block or only bradycardia can also be easily decided on the Röntgen screen. In case of "dissociation" I was able to observe that one pulsation of the aorta always corresponded with 2-3 pulsations of the right auricle.

To make röntgenoscopic observations of the pulsations of the heart, a considerable amount of practice and experience is requisite. We have, however, lately succeeded in reflecting and studying the pulsation of the heart by means of röntgencinematography. The first pictures of this kind I was able to demonstrate before the "Verein fuer innere Medizin" in Berlin in the year 1909. Meantime I have constructed better cinematographic apparatus, so that the change of plates takes place more accurately. By employing better screens (the Sinegran screen)* and a one-flash apparatus (Unipuls)* the pictures have become much more distinct. Quite recently I have combined the röntgencinematograph with an electrocardiograph, so that now for every picture the respective phase of the heart can be exactly defined. I must also mention here the recent attempts to represent on the screen the circulation of the blood in the large vessels and in the heart. Alwens and Frank have succeeded in doing this with animals by injecting bismuth-oil in the blood-vessels. Whether these experiments will and can afterwards be extended to human beings or not, is of course very questionable.

Whereas for studying the pulsation of the heart we chiefly employ the sagittal diameter, it is found better to make use also of the frontal diameter at the same time, when examining *the position of the heart*. I must here refrain from discussing the pictures made by the oblique diameter, as they can scarcely be described without illustration. The oblique diameter is of especial importance for examining the aorta, which, however, is outside the subject of this article, and to decide whether a bulging out of the left side of the heart is caused by the auricle or the pulmonary artery. In general the simple method of fluoroscopy will be found sufficient, but more exact results are obtained by employing one of the orthoröntgenographic methods, especially orthodiagraphy. A röntgenphotograph is rarely necessary to be taken, unless it be to secure an illustration of a rare case, or to find out the cause of a dislocation by means of photography.

Examination by means of x -rays has above all placed the fact beyond doubt that there is no invariable rule for the position of the heart. It has been ascertained orthodiagraphically that about one-third of the heart lies to the right and two-thirds to the left of the median line. According as the position of the longidiameter of the orthodiagram (it corresponds approximately to the axis of the heart) is to the axis of the body, we speak of the perpendicular, oblique, or horizontal position of the heart. By far the most frequent position is slightly oblique. The

*Reiniger, Gebbert and Schall, Berlin.

perpendicular position is found chiefly with young, slender people, but also in cases of the so-called *habitus asthenicus* of adults, whereas the horizontal position is generally speaking a peculiarity of old age. Again, space will not allow me to give exact topographical details. I will only mention the very important fact, that the apex-beat is mostly felt outside the cardiac dulness, which we find by means of orthodiagraphy, the reason being that the apex-beat is directed obliquely towards the wall of the thorax.

Our knowledge of the position of the heart is greatly increased by employing the frontal diameter. We see that the heart is placed obliquely in the thorax, at the top backwards and at the bottom forwards, and is fixed firmly between the wall of the thorax and the diaphragm. Therefore we speak of the part of the heart which is sunk into the shadow of the diaphragm. Another result of these positions is the division of the frontal shadow of the thorax into the front retrosternal and a rear retrocardial region of the lungs, between which, as described above, the shadow of the heart is placed diagonally.

Of the physiological facts that influence the position of the heart, the respiration must be mentioned first. By the pericardium, the heart is held fast partly to the diaphragm (the *Herzboden*) and must therefore take part in all the movements of the latter. During inspiration it becomes longer, narrower, and more perpendicular; during expiration broader, shorter, and more horizontal. By means of roentgencinematographic studies I have been able to ascertain that, with normal gentle respiration, no change in the size of the heart takes place, there being merely the above-mentioned dislocation.

When the position of the body is changed, the position of the heart passes through changes similar to those caused by respiration. When lying on the left side, the heart moves on an average of 2.5 cm.; when lying on the right side on an average of 1.5 cm. But this degree of movement is also dependent upon various other circumstances, *e. g.*, corpulency, etc. When lying in a horizontal position the heart moves upward and becomes broader than when standing or sitting and also seems to be larger. It is for this reason that Moritz has declared the inadvisability of measuring the heart when the body is in a vertical position, but the arguments which he has brought forward have, on closer examination, proved altogether untenable, as I have shown in a paper on this subject in the *Annalen der städt. Krankenhäuser in Muenchen* (Vol. XIII).

Among the pathological variations of the normal position of the heart, we may first mention the congenital dislocation of the heart, the most frequent of which is the complete lateral inversion in cases of *situs viscerum inversus*. It is only since *x*-rays have been used for examining the heart, that we know that this is of relatively frequent occurrence. I have myself reported two cases in the *Atlas und Grundriss Rönt-*

gendiagnostik in der inneren Medizin (J. F. Lehmann, Munich, 1909).

Acquired dislocations of the heart are also of very frequent occurrence. Every abnormal position of the diaphragm can lead to such a dislocation. If the left diaphragm is raised by an abnormal quantity of gas in the stomach, the heart is moved to the right; on the other hand, when the right diaphragm is raised by an enlargement of the liver, the heart is moved to the left. A similar effect is produced by tumors in the abdomen, ascites, pregnancy, etc. To this group may also be added the "drop-heart" (medium position of the heart) in cases of *habitus phthisicus*. Just in the same manner as the heart changes its position following the movements of the supporting diaphragm, so it also follows the change that takes place in the lungs. Tumors and pleuritic exudations in the lungs press the heart to one side, pleuritic adhesions draw it aside, emphysema of one side of the lungs thrusts it to the other side, especially when in the latter, through pathological processes, the quantity of air is reduced. Thus in tuberculosis of the lungs we find a manifold variety of positions. Finally the suspending apparatus of the heart, that is the large vessel, changes its position by becoming longer, and sinking. The heart then takes the horizontal position (old age heart). I may also mention here the emphysema-heart: with emphysema of the lungs the diaphragm is flattened, the "Herzboden" being therefore low down; and the result is that the heart is very much narrowed and stretched.

The motility of the heart also shows variations from the normal under pathological conditions. Thus every change in the normal type of respiration produces a corresponding change in the respiratory movements of the heart. Especially well known is the "inspiratory" dislocation of the mediastinum into that half of the thorax where the stenosis is situated, in all processes that are combined with the contraction or compression of a lung, as for example stenosis of one bronchia, pneumothorax, aneurysm, etc. Adhesions between pleura and pericardium, even when they are very slight, often become only manifest by abnormal respiratory movements of the heart. Another very appropriate means of finding out the changed motility of the heart is examination in different positions of the body. We find the motility of the heart reduced in all above-mentioned cases of dislocation or abnormal respiratory movements, when lying on the side, and an increased motility in cases of aggravated chlorosis, enteroptotic habitus, etc.

As regards the normal *form of the heart*, something was said, when discussing the marginal curves in the shadow of the heart and the large vessels. The entire sagittal silhouette of the heart appears to us in a somewhat elongated egg-form, but it is not possible to give any definition that can be generally applied. Every heart shows slight variations, so that there are never two heart-orthodiagrams of different persons which are exactly alike. Nevertheless, it is comparatively easy to detect a change in the shadow of the heart, as we usually find, besides general changes

in form and position, extremely typical changes in the different marginal curves, and these are as a rule combined with a changed type of pulsation. It is, I think, not saying too much, when I assert that just this branch of the Röntgen diagnosis of the heart will in future bear most fruit. We find occasionally this subject mentioned by Santiard, Grunmach, Kœhler, Destot, de la Camp, Holzknecht and F. Kraus. The first attempt, however, to fix a typical form of the heart for most of the cardiac affections was made by Th. Grœdel and myself, the results of which were on the whole confirmed by Kœhler and Dietlen. For the congenital heart diseases we have lately composed a röntgenological symptomatology in the *Deutsches Archiv fuer Klinische Medizin*.

I will give here a short sketch of the best known pathological forms of the heart, without, of course, giving anatomical explanations; details on this subject will be found in the above-mentioned Atlas, p. 151-156, and in another work of mine that is in print "Die Röntgendiagnostik der Herz-und Gefässerkrankungen" (Hermann Meusser, Berlin, 1911).

In all cases of an affected aortic valve we find a so-called "aortic heart." It is pronouncedly horizontal, "recumbent egg-form." The greatest increase in size is always to be found in the left lower curve, a less pronounced one on the right lower curve. The greatest enlargement of the heart we find in cases of aortic insufficiency, when we can almost always see a pulsatory, already anatomically fixed dilatation of the aorta in the form of a bulging-out of the right upper curve. Stenosis of the aorta shows similar symptoms—of course without dilatation of the aorta—but in a less degree. The same thing may be said of the sclerotic stenosis of the aorta, sclerosis in the beginning of the aorta, aortic aneurysm near the heart, and all other cases (*e. g.*, old age heart) in which the evacuation of the left ventricle is impeded.

A comparatively small heart is found in cases of mitral stenosis, which is but seldom without complications. Frequently, even the curve of the left ventricle is reduced, which sometimes denotes a hypoplasia of the left ventricle. The other marginal curves have generally nothing particular to show, except the curve of the left auricle, which is enormously enlarged and pulsates violently. Thus we have an "upright oval form."

Another picture is afforded by insufficiency of the mitral valve. Slight cases may occur without the form being changed in the least. A mitral insufficiency of longer standing, and especially if it has been frequently decompensated always results in a "ball-formed" (round) heart. The heart is enlarged equally on all sides. The curve of the right auricle is usually very much bulged out; the curve of the left ventricle is enlarged and at the top melts into the curve of the right ventricle, which bulges out to the left, upwards towards the arm-pit, and thus thrusts back the curve of the left auricle and at the same time covers the left auricle itself, which is of course greatly dilated.

At the same time I must state here, that pure insufficiency of the mitral

valve, as well as the pure mitral stenosis, is of rather rare occurrence. The two affections of the valves occur much more frequently combined than we can clinically state it; therefore, we very often find the characteristics of the two forms united. The curve of the pulmonary artery can be enlarged by all affections of the mitral valve, mostly in case of decompensation. In such cases we can frequently distinguish as a special curve, in the curve of the right auricle, the appendix of the right auricle.

It is also worthy of mention that with combined lesions of the mitral and aortic valves, all the peculiarities of the different defects of these valves are discernible. In such cases the marked oblique position of the heart is typical. In cases of tricuspid insufficiency we often see enormous changes in the size of the right auricle.

Of all the congenital affections, the persistence of the ductus arteriosus Botalli affords the most typical Röntgen picture. The most evident symptoms are the distension and pulsation of the pulmonary artery, and the enlargement of the right ventricle, by which a round heart (mitral heart) is formed.

Congenital stenosis of the aorta (I have myself observed two cases) also shows an enlargement of the curve of the pulmonary artery. In this affection the left ventricle is as a rule enlarged, so that the heart assumes a recumbent cylindrical or egg-form (aortic heart). In cases of stenosis of the pulmonary artery I have not been able to detect any changes whatever in the Röntgen picture.

Ventricular movements in the right margin of the shadow of the heart signify a defect in the ventricular septum. On the other hand, in cases of foramen ovale apertum we have likewise found no special roentgenological symptom.

For the different forms of myocarditis, cardiac complaints connected with chronic nephritis or arteriosclerosis, neurosis of the heart, phrenocardia, constitutional weakness of the heart, etc., many diagnostic Röntgen symptoms can be enumerated; however, as this would lead me too far, I refer for further information to my above-mentioned works.

An exact description of the Röntgen shadow in cases of pericarditis also surpasses the limits of this paper. In cases of exudative pericarditis we see the well-known triangular form of the heart shadow. A good Röntgen photograph is of especially great service when the exudation has to be removed by operation.

In cases of dry pericarditis and residues of an exudative pericarditis, the pericardiac adhesions can very easily be demonstrated. This too is necessary in case of operations, if the working of the heart is to be relieved by "cardiolysis." Calcinations of the heart have not yet been demonstrated *intra vitam*. A short time ago I found, for the first time, a shadow of calcination in the pericardium. The case in question, published in *Fortschritte auf dem Gebiet der Röntgenstrahlen*, Vol. XVI., is peculiarly interesting because it was at the same time possible to recognize the separate cavities of the heart.

Before passing on to the results of *defining the size of the heart*, I must give a brief explanation of the orthoröntgenographical methods, referring for all further details to my instructions for working with parallel x -rays ("Die Orthoröntgenographie," J. F. Lehmann, Munich).

Of the different photographic methods only the "Kœhler teloröntgenography" has proved a success. The reason for this is, that with 2 m. distance between the tube and the plate only extremely small changes in size take place, and these are so small that they can be disregarded without any detriment. It is true that this method is technically easier to use, since we generally employ short exposures. But the cost of production compared with orthodiagraphy is disproportionately high.

Orthodiagraphy will in all probability continue in use in future where examinations of the heart by x -rays are carried on regularly. The great advantage of orthodiagraphy is the employment of only one x -ray (that is to say, one small sheaf of rays) which is carried round the heart, thus showing the outlines of the heart. The first apparatus, which, however, could only be used for horizontal drawings, was that of Moritz. For perpendicular examinations that of Levy-Dorn is a very practical construction. This I succeeded in modifying considerably some years ago. Perpendicular orthodiagraphy, being much more practical than horizontal, has now come into general use. If examinations are always made in a sitting posture, as I have proposed, the results are in every respect indisputable.

The special value of the orthodiagram is to be found in the exact reproduction of the form of the heart and its details; the measurements seem to me to be only of secondary importance. For, in spite of all its exactness, the orthodiagram gives us only approximate and not absolute figures. I do not mean by this that exact measurements of the heart are not necessary, and for which orthodiagraphy still remains indisputably the safest and best method.

For the measuring of the orthodiagram, numerous instructions have been given. For general practice, however, it is sufficient to keep to the few sizes that can be really measured with accuracy. These are the greatest distance between the right and left margins of the heart and the middle side of the sternum, the median distance to the right and to the left, which together give the transverse dimension; and the longidiameter, the greatest distance of the heart apex from the point of the division between the two right curves. By the examination of a large number of persons with healthy hearts for these dimensions, a list of average figures has been drawn up. This was done for horizontal diagraphy by Dietlen, for perpendicular orthodiagrams (sitting) by myself, and for children's hearts by Veith. In this way we are now enabled to detect even relatively slight deviations of the heart measurements from normal conditions. But even at the present day we are not able, and this should be especially emphasized, to measure the size of the heart to a millimeter. For just

the numerous examinations of healthy hearts have shown that even, when we take into consideration the size of the body, the weight of the body, and the age of the individual, there are still great variations in the average figures. The profession, the condition of nourishment and many other factors have also to be taken in account.

Besides determining physiological changes in the heart and its use in defining exactly the enlargement of the heart, orthodiagraphy has rendered very good service in a number of more or less experimental works, especially as to variations in the volume of the heart; and it is used daily for this purpose. I can only give here a summary of the most important of these applications and their results.

Bingel found that fencing had no influence on the size of the heart. The same thing was ascertained by Lennhof and Levy-Dorn, Mendel and Selig in regard to wrestling, Moritz as far as bicycling is concerned. Grunmach and afterwards de la Camp found, that even a maximum of physical exertion does not produce any dilatation of the normal heart. Later on Kienböck, Selig and Beck gave a report about acute diminution of the heart after a trying swimming race and other physical exertions. Dietlen and Moritz came to the same results in regard to bicycling. Before that, de la Camp and Freund had observed the same thing with neurasthenia cordis. Dietlen reported about tachycardia paroxymalis which in 2 out of 3 cases had produced a slight diminution of the heart during the attack, and Th. Gröedel who four times in 56 cases detected a very slight diminution of size. On the other hand Schieffer, Dietlen, Moritz, Kienböck and his collaborators have all found, that with continued over-exertion the dimensions of the heart gradually increase. A pathological heart does not become enlarged, as de la Camp reports, by a *single* over-exertion. Grunmach, Moritz, Bickel, Bingel, Hoffmann and de la Camp, all state that alcohol, morphia, hydrate of chloral, chloroform, caffeine, nicotine, etc., have no influence on the size of the heart. Moritz states that atropine produces a great diminution of the heart. The influence of various infectious diseases upon the size of the heart has been described by Schieffer and, with more details, by Dietlen. During attacks of stenocardia and bronchial asthma, diminutions of the heart have been detected by Kienböck, Moritz, Goetzl, Dietlen. Observations in regard to the influence of various therapeutic treatments have also been made. Rimbach saw the heart decline after manual massage, Rumpf on introducing oscillating currents into the body, Selig after vibration massage and Schott after one gymnastic exercise (?!), whereas I have stated that any considerable change in the size of the heart cannot be produced by gymnastic exercises. Schott and also Kingscote have observed a diminution of the heart after a single carbonic acid bath; whereas Grunmach and afterwards Th. Gröedel and myself could not detect this. Quite recently Beck and Dohan have reported that the heart becomes enlarged through cold baths and smaller through hot baths. In conclusion may

be mentioned the observations made as to the changes in the size of the heart in connection with abnormal form of the thorax, especially in scoliosis and in chronic diseases such as tuberculosis.

It has not been possible for me, in the limited space at my disposal, to give an exhaustive description of all that x-rays can do in examining the heart. The facts I have stated, however, will prove that the Röntgen rays have considerably advanced our knowledge of the physiology and pathology of the heart, and that we are entitled to expect still greater progress. In conclusion, I wish to lay stress upon the fact that a Röntgen diagnosis of the heart can never stand alone, but only in connection with all the other clinical methods of examination. It is merely to supplement and improve them. How much orthodiagraphy has done, in this respect, for improving percussion is sufficiently proved by the numerous works on the subject.

TREATMENT OF CARDIAC DISEASE IN CHILDHOOD.

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In a brief paper on the treatment of cardiac diseases of infancy and childhood, it will not be possible to cover the entire field. It will, however, be the aim to point out some of the striking differences which exist between the cardiac diseases of infancy and childhood and adult life; and call attention to the most important points in the treatment.

The blood-pressure in the child's cardiovascular system is relatively low. It is an old observation, credited to Beneke and verified by Baginsky, Von Dusch, Bednar, Engel and others, that in childhood the cardiac cavities are small and the arterial bed is wide. At about the time of puberty the condition becomes reversed and the adult type of large heart and relatively small arteries is established. It may be noted in passing that it is at the period of puberty that so many children show signs of failure in compensation. Possibly the change in cardiac function will explain the decompensation at this time. Little can be said of, and much less can actually be done in the congenital heart affections, and consequently their treatment will not be brought up for consideration.

The most frequent cause of acquired heart disease in childhood is rheumatism, though Concetti inveighs against the rheumatic theory. He believes that some children are congenitally predisposed to the acquirement of cardiac affections; and for this reason he considers that some children are born with a cardiac dystrophy, which predisposes to cardiac inflammation. While we must concede the possibility of some children showing greater resistance against heart disease than others, nevertheless the clinical fact, that heart disease is for the most part a rheumatic inflammation, is well established. I have seen several instances where all of the children of a family fell ill at different times with rheumatism and subsequently were attacked with inflammatory cardiac affections. Chorea should not be ascribed as an etiological factor, because it is generally agreed that chorea, like the cardiac affections, is in most cases a manifestation of rheumatism. Rheumatism is not the only cause of acute cardiac disease.

Acute follicular tonsillitis bears a close and undoubted causal relation to endocardial inflammation. Scarletina, pneumonia, and the other acute infections, as typhoid, measles, and variola, are occasionally causative factors. Gonorrhea, which is comparatively rare in children, does not have the importance in the production of this variety of inflammation that it has in adults.

In my series of cases observed at the dispensary, scarlatina seemed the etiological factor in 9 out of 30 cases. This is a large percentage, and is to be explained by the fact that scarlatina had been very prevalent in the neighborhood of this dispensary.

The tuberculous endocarditis of general miliary tuberculosis is not a common condition.

Rheumatism is rare under three years of age and under two years is almost unknown. It occurs with increasing frequency after the sixth year. Nevertheless, malignant endocarditis does occur even in infancy as a result of sepsis. In children, the rheumatic affections of the joints may be very indefinite. The child may complain only of slight pain, or there may be some painful affections of the limbs, which are interpreted as growing pains. The rheumatic manifestations may appear so mild and ill-defined that they escape detection, and yet before one is aware, the child may be attacked with breathlessness, precordial distress, and the physical signs of a valvular lesion. I recently saw a little fellow of six years of age who complained for several days of severe headache, frontal and occipital neuralgia, and somewhat obscure abdominal pain, together with moderate elevation of temperature. Several days elapsed before joint pains were complained of. About this time he had slight dyspnea and precordial pain; the physical examination revealed some enlargement to the right, with a moderate hypertrophy to the left, and a soft, blowing mitral systolic murmur.

In children as in adults endocarditis may be divided into the simple and the malignant, or septic. The former occurs usually as a manifestation of rheumatism, scarlatina, pneumonia and other infections. It usually leads to valvular lesions. Septic endocarditis usually occurs in association with some septic process in another part of the body, which leads to more or less erosion of the valve, and usually terminates fatally. The left side of the heart is more frequently involved than the right.

In children, the inflammatory process is not always confined to the endocardium. Indeed, the myocardium and pericardium are sometimes simultaneously involved, leading to a condition which the English writers have aptly termed "carditis."

Pericarditis is frequently associated with acute endocarditis. Its presence is made manifest by the occurrence of pain, though in the subacute variety of pericardial inflammation there may be little or no pain, and children may be up and about during the entire attack. Pericarditis, in association with acute endocarditis, usually renders the course of the disease more severe and makes the immediate, as well as the remote, outlook for recovery more unfavorable. Children with acute peri-endocarditis may show great nervousness and delirium. The temperature is high and dyspnea considerable, the face pale and the expression anxious.

In pericarditis the heart is usually dilated, the heart muscle being soft and flabby and showing well-marked inflammatory changes. It is due to

this "carditis" that cardiac dilatation is almost universally present. It is because of the inflammatory and degenerative changes which occur in the cardiac muscle, that pericarditis is an unfavorable complication. The increase in cardiac dulness is one of the earliest physical signs. The dulness may extend upward as far as the second intercostal space and for an inch outside the nipple line and an inch or more external to the right sternal line. It is frequently thought that this increase in size is due to an effusion. In a certain proportion of cases this is true, but, in the vast majority of instances of rheumatic pericarditis, the increase in size of precordial dulness is to be attributed to cardiac dilatation.

Poynton and Lee show, from an analysis of the post-mortem records of 150 cases of fatal rheumatic heart disease in children, that cardiac dilatation is usually present and marked excess of pericardial fluid is rare. In only 12 cases out of 150 was there an excess of pericardial fluid amounting to more than two ounces. Out of 79 cases of paracentesis pericardii collected by Dr. Samuel West, only eleven were of rheumatic origin, and in only one of these eleven was the effusion large in amount. Of the whole number of patients, only four were under the age of twenty, and there was no fluid.

Acute myocardial inflammation is not infrequent in children. It occurs with the various infectious diseases: diphtheria, typhoid, scarlet and influenza, and this group may be spoken of as infectious myocarditis. Toxines of diphtheria have a peculiar and pernicious influence upon cardiac muscles. The toxic products of the diphtheria bacillus tend to combine early with the muscle cells, though they may remain latent for a time. They tend sooner or later to diminish the tone and strength of the heart and to produce disturbances of rhythm, eventually causing dilatation and weakness of the myocardium. Diphtheritic myocarditis occurs in 10 to 20 per cent. of all cases of diphtheria. The symptoms become most marked during the second or third week of the illness, sometimes during the sixth to the tenth week of the convalescence. These patients frequently complain of a feeling of oppression in the chest, or a pain over the liver. They vomit so frequently as to remind one of a peritonitis, or of an obstruction of the bowels. The pulse shows arrhythmia and frequently the heart discloses no other objective sign, though dilatation to the right and left is not infrequent. A certain amount of nephritis is nearly always present. Neither typhoid nor scarlet produces such marked myocardial symptoms as occur in diphtheria.

Influenza is capable of producing myocardial inflammation. The severe forms of inflammation in influenza seem to affect those who have had a previously weak heart, or who are obese or debilitated.

In the prophylactic treatment of this group of acute cardiac affections, we stand wellnigh helpless. It may be said that children differ materially as to the degree of resistance of the cardiac structure against disease. Perhaps we may be allowed a flight of the imagination. In one instance,

the heart muscle is composed of fibre whose quality represents strength, resistance and durability, while, in another instance, the fibre is of a quality low in strength, inferior in resistance and poor in durability. The quality of this fibre may be influenced by a variety of factors. It may be congenitally poor; it may have acquired an inferior quality because of injudicious or unwise feeding during the first years of life. The patient may be obese and the heart muscle infiltrated or surrounded by fat or relaxed from want of bodily exercise. The real prophylaxis of cardiac disease, if it is at all possible to conceive of such, would consist of increasing the resistance of the heart by strengthening its fibre. To do this the individual should take a fair amount of bodily exercise. Just as the skeletal muscle may be developed and hardened to perform feats of strength or to do work, so the cardiac muscle may be strengthened by graduated exercise. This is advised particularly in weakly children, or those who come from parents who are feeble or have constitutional disease or taints. The form of exercise to be suggested is quite immaterial and may consist of gymnastics, swimming, bicycle-riding, rowing, skating, or playing games in the open air. On the other hand, particularly in children, over-exercise may defeat the very purpose for which it was intended. Clinical records are complete with cases of cardiac dilatation due to overstrain. Valuable chapters have been contributed to medical literature on the production of hypertrophy and dilatation induced by prolonged marches, Marathon races, immoderate feats of strength and excessive or violent work or play. Here may be mentioned football as played by immature boys. It may be stated as an axiom that such exercise may be considered healthful which is not carried to the point of fatigue. All exercise, which exceeds this point, ceases to be beneficial.

In the same way, the nutrition of the body may be considered in the prevention and production of cardiac disease. The child, who is receiving a well-balanced diet with a sufficient amount of carbohydrate food and vegetables, and with no excess of proteid, tends to resist in a degree the functional, as well as the inflammatory, cardiac affections. Those children, who are improperly nourished and more or less in a condition of starvation, or those recovering from acute infectious diseases or from gastro-intestinal disorders, offer correspondingly less resistance against cardiac affections. In older children alcoholic drinks should be prohibited.

Frequent bathing, with cool sponging or showers, produces a certain degree of "hardening."

In this modern era of "fresh air" and "sleeping porches," a word of warning should be sounded. Not every child can bear with impunity undue exposure to cold and all kinds of weather. We frequently see children attacked by rheumatism in whom the hardening process has been carried on too zealously.

Since it is a well-recognized fact that acute and recurrent tonsillitis is frequently the forerunner of rheumatism and cardiac disease, children thus affected should have their tonsils and adenoids removed. During an attack of tonsillitis the salicylates should be energetically administered.

A patient, who is suffering from rheumatism or ill-defined pain such as is sometimes described under the caption of "growing pains," should be treated actively and early with one of the salicylate preparations.

In case of diphtheria, anti-toxin should be administered early and in sufficient dosage to neutralize the toxine. Myocardial attacks in diphtheria occur early, and if treatment is to be effectual, it must anticipate this possibility.

TREATMENT OF ACUTE ATTACK.

In all varieties and degrees of acute cardiac disease, the most important element in treatment is rest in bed. This statement cannot be made too emphatic. In the mild cases it is surprising what degree of resistance parents offer to this plan of treatment. One can almost hear them say, "You don't know the child; you can never keep him in bed." Almost any child can be put to bed, given a few toys and be left to amuse himself. Even in this respect, great care must be taken, lest he over-exert himself by play. The most complete rest that is possible should be enjoined. The child should be kept in bed until the pulse is nearly normal in frequency and tension. Very frequently the arrhythmia and the initial insufficiency which is caused by dilatation will disappear. Four to five weeks is as a rule the minimal period required; not exceptionally, eight to ten weeks will be necessary. In the myocardial disease produced by diphtheria, great caution should be observed in permitting the patient to leave his bed. Sudden syncope and death may occur upon slight exertion.

Before the patient is actually allowed to leave his bed, he should be permitted to sit up for an hour or two each afternoon. In a few days more he may be permitted to carry on some gymnastic practice. Moderate dumb-bell exercise for five or ten minutes may be employed. The duration of this should be gradually increased. When the patient is allowed to get up, his exercise should be restricted and a certain portion of the day be spent in bed or in the half-recumbent posture. After several days, he may be allowed to climb four or five stairs, under pulse control. Carbon-dioxide baths at this time tend to increase the strength of the heart muscle and to diminish passive congestion. The patient should not be given his full freedom for a considerable time. He certainly should not be allowed to join his playmates on the playground until his pulse indicates a return of tonicity and strength of cardiac muscle. In cases where the pericardium is involved, or where the cardiac action is frequent or tumultuous, an ice-bag should be placed over the heart. If rheumatic

pain or arthritis continues, salicylates should be pushed energetically. Of the salicylates, the sodium salt, salicin or aspirin (acetyl salicylic acid) are the most reliable. For a child six or seven years of age, twenty grains of the sodium salicylates or salicin may be given in twenty-four hours. They should be combined with an equal quantity or twice the amount of bicarbonate of soda. The addition of the soda has been suggested, because it is believed that continual use of the salicylic acid derivatives may produce acidosis, with the symptoms of vomiting, rapid and superficial respiration, and drowsiness or coma. Observant of this precaution, however, children bear the salicylates well. Children of ten years or older may be given thirty or forty grains of salicin or sodium salicylate in twenty-four hours. Aspirin is useful and its effect prolonged, though it should not be combined with an alkali. It is true that the preparations of salicylic acid will not assist in the repair of valves which have been damaged, nor cause the absorption of pericardial exudate, nor mitigate the effect of myocardial inflammation. The damage which has already been produced cannot be remedied by the use of any known drug, but we have reason to think that the use of salicylates, if given sufficiently early, will neutralize the effect of the rheumatic poison and thus minimize cardiac inflammation. It may be said, too, in this connection, that relapses of rheumatism, however mild, should at the moment of reappearance receive most vigorous treatment.

Heart tonics are not required in every case. Their use is indicated where there is evidence of cardiac weakness. This applies to myocarditis as well as to the endo- and pericarditis. Of all the drugs in vogue, preparations of digitalis prove most efficient. Digalen or tincture of digitalis in two or three drop doses, three or four times daily for a child of six or seven years of age, are valuable remedies. As concerns the comparative value of digitalis and other cardiac tonics, it may be stated, as a general proposition, that digitalis is the most reliable of all the known remedies, and that if it fails, no other will succeed, though some authorities maintain that strophanthus is of decided value in stenosis and severe dilatation.

McKenzie says that digitalis is useful in those cases of heart failure where there is dilatation with healthy muscle fibres, that have become exhausted in an endeavor to overcome abnormal resistance. In cases of dilatation of the heart with a weak and insufficient systole, its action is almost specific. The drug is of very little use when the dilatation of the heart is due to relaxation of the muscle fibres. The degree of reaction is an index of the extent to which degeneration has gone on. Digitalis is not indicated in simple tachycardia or in cases of arrhythmia. For the fever of acute endocarditis no special treatment is required. The salicylates already referred to tend to control the temperature. Tepid sponging may be employed when there is fever with restlessness. If the patient is extremely restless, with dyspnea and pericardial distress, small

doses of codeine, $1/20$ to $1/12$ grain for a child of six years, or morphine, $1/60$ to $1/30$ grain hypodermatically, or 1 to 2 grain doses of Dover's powder, repeated three or four times daily, if necessary, give the most prompt and striking relief.

When the acute stage is terminated, after a prolonged rest in bed, the child should tentatively be allowed to take short walks; all violent exercise must be prohibited, resistance exercises may be given, and a considerable period of time should elapse before the child is permitted the full range of its physical powers and activities.

The danger of producing chronic invalidism and hypochondriasis is not to be lost sight of. Nevertheless, in those cases where the valvular defect is extensive or the myocardial degeneration is marked, the limitation of physical effort is of paramount importance.

Broken Compensations.—Sooner or later, in most cases of valvular lesion, some disturbance of compensation will occur. If passive congestion of other organs or loss of cardiac tone, or if dilatation occurs in a patient who has previously suffered from a myocarditis or a valvular lesion, he should be placed in bed and as far as possible, physical and mental rest should be enjoined. In most of such cases the use of digitalis is indicated. The occurrence of edema or effusions into the serous cavities should be treated by diminishing the fluid intake, continuing the use of digitalis, stimulating elimination through the skin and by the administration of laxative drugs and diuretics. Diuretin may be given in two or three grain doses for children of six or seven years, and is one of the most reliable diuretic drugs. It was Stokes, who long ago advised the use of calomel for the diuretic effect. Small doses of $1/10$ to $1/16$ of a grain should be given three times daily for three days, though it should be used with considerable care, especially in those cases where there is kidney involvement. It is rarely necessary to resort either to puncture of the skin, or peritoneal cavities, for the relief of fluid accumulation.

The much-vaunted strychnia is valuable in those cases, acute or sub-acute, which depend upon disturbance of cardiac innervation, particularly in cases of post-diphtheritic myocardial involvement, and the influenza myocardial affections. It is doubtful whether strychnia is a real cardiac muscle stimulant. It was H. A. Hare who wrote some years ago on strychnia as a cardiac tonic. He compared its use to whipping a horse that was going full speed. Strychnia may stimulate by increasing the work done by the heart, not necessarily increasing its force; and like the horse that is being whipped, the heart is likely to stumble and fail.

In cases of sudden syncope, camphorated oil, hypodermatically, may be used to relieve the acute cardiac failure.

In cases of chronic pericarditis with obliteration of the pericardial cavity, the heart may be firmly adherent to the sternum and ribs anteriorly and to the spinal column posteriorly. Thus during each systole an extra strain is placed upon the heart muscle. To overcome this condition Brauer

has suggested his operation of cardiolysis. It consists of resecting the ribs which cover the heart; the sternum is not removed. By this operation the interference with heart action is considerably lessened and favorable results have been reported. Brauer suggests that good results can be obtained only when the heart muscle itself has not been materially weakened by disease. If the heart does not maintain sufficient strength to retract the chest wall, after removal of the ribs, the operation is useless.

THE HYDROTHERAPEUTIC TREATMENT OF HEART DISEASE.

By JOHN M. SWAN, M. D., of Watkins, N. Y.,
Medical Director of The Glen Springs.

Excluding diseases of the pericardium and of the mediastinal tissues, which may affect the heart, the chronic diseases of that organ may be divided into chronic valvulitis in its various forms, and disease of the myocardium. Chronic valvulitis is the result of a previous acute endocarditis, or primary fibrosis, or of a rupture of one of the leaflets of one of the valves due to trauma. The condition of the valves in a case of chronic valvulitis is the result of cicatrization of the acute lesion. The resulting disturbance in the passage of the blood through the various chambers of the heart and into the great arteries, the aorta and the pulmonary artery, produces changes in the heart muscle which are of grave importance to the circulation. In order to provide for the needs of the systemic circulation in particular, the myocardium undergoes a local or a general hypertrophy, sometimes with and sometimes without dilation of one or more of the chambers. An hypertrophied heart muscle cannot be considered normal and sooner or later degenerative changes occur in it which result in further circulatory disturbances and produce the symptom-complex known as lost or broken compensation. The change may be a fibrosis, fragmentation, or fatty degeneration, or any combination of these morbid processes.

Apart from the changes in the heart muscle dependent upon valvulitis, that muscle may become diseased in the course of any of the acute infectious diseases, diphtheria, typhoid fever, influenza and malaria, for example. The form of change seen in these cases is the result of cloudy swelling and is known as *parenchymatous myocarditis*. The myocardium may become diseased by the extension into it of the fibroid changes which accompany general arteriosclerosis, the coronary arteries in this instance usually forming the starting point for the increase of the connective tissue of the heart muscle at the expense of the muscle tissue; *cardiac-fibrosis*, *fibroid myocarditis*. The myocardium may become damaged by the deposit of fat in the normal connective tissue of the muscle in cases of general obesity; *fat heart*.

Fatty degeneration of the myocardium is the last stage of the parenchymatous form of myocardial alteration, and of the hypertrophy due to valvulitis, renal disease, and overwork.

Dilation of the heart without compensatory hypertrophy is usually accompanied by important changes in the myocardium.

The functional capacity of the heart depends entirely upon the condition of the heart muscle and not at all upon the disease of the valves. So in the therapeutics of chronic heart disease, an estimation of the integrity of the muscle is of first importance. When the muscle begins to fail either from changes in the muscle fibers, from increase in connective tissue, or from the deposition of fat, the therapeutic problem is to restore that muscle as much as may be to its functional integrity.

This contribution is not concerned with the possibilities of drug administration, as important as that is, but to point out the results that can be obtained by the use of rest, hydrotherapeutic measures, and exercises. The combination of these three methods of treatment is commonly known as the *Nauheim treatment* of chronic disease of the heart. The treatment has been in use since 1835; but has been prominently brought to the attention of therapeutists generally since about 1880, through the writings of Beneke, Grödel, the Schotts, and many others. The chief hydrotherapeutic method employed at Bad Nauheim is the immersion of the patient in a full bath of a natural brine which is charged with free carbonic acid gas. The important constituents of the Nauheim bathing waters are sodium chlorid and calcium chlorid. The Nauheim physicians have always held that artificial baths can be prepared which will accomplish good results if properly managed; but there is an advantage in the employment of a water in which the solution of the saline ingredients has been brought about by natural processes. The Nauheim bathing waters contain the following percentages of sodium chloride and calcium chloride: *Grosser Sprudel*, sodium chloride, 1.95 per cent., calcium chloride, 0.13 per cent.; *Friedrich Wilhelm Sprudel*, sodium chloride, 2.71 per cent.; calcium chloride, 0.27 per cent., and *Ernst Ludwig Sprudel*, sodium chloride, 2.27 per cent., calcium chloride, 0.24 per cent.

At The Glen Springs a natural brine containing sodium chloride, calcium chloride and other mineral ingredients is used for the administration of carbonated brine baths. The water is obtained from an artesian well 1500 feet deep. It is pumped into large reservoirs from which it is piped to the bath rooms. As the water flows from the well into the tanks it has a temperature of 56° F. It is usually perfectly clear and colorless and contains numerous bubbles of gas of varying size. It is strongly saline to the taste and is without odor. After standing for a time it becomes cloudy and begins to deposit a precipitate which is dark grey in color with a tinge of yellow. After standing for twenty-four hours this deposit collects in the bottom of the vessel as a dirty brown flocculent sediment, and the supernatant water is cloudy with the suspended particles of this precipitate. Under the microscope this precipitate is seen to be composed of fine, yellowish granules; large, irregular, reddish masses, amorphous in character; colorless amorphous masses,

and some large blackish masses. A specimen allowed to stand for 48 hours gave 0.1572 grm. of this precipitate to the liter. The precipitate gives the qualitative reactions for iron. The salimeter registers 65. The water is neutral to litmus, to phenolphthalein, and to Congo red.

An analysis made in 1910 by Professor E. M. Chamot, of Cornell University, gave the following results:—

	Grams per Liter.
Total Solids.	213.8
Loss on Ignition.....	38.6
Silica.	0.79
Oxides of Iron and Aluminum.....	0.03
Calcium (Ca).....	14.9
Barium (Ba).....	0.03
Magnesium (Mg).....	4.2
Nitrogen (N) as NH ₄	0.85
Sodium (Na).....	47.3
Potassium (K).....	0.008
Lithium.	Trace
Chlorine.	111.0
Carbonic Acid (CO ₂) half-bound.....	0.01
Carbonic Acid (CO ₂) free.....	0.17
Sulphuric Acid (SO ₃).....	Trace

“These constituents are in my opinion combined as follows”:—

	Grams per Liter.	Grains per U. S. Gallon.
Total Solid Residue.....	213.8	12,400.
Organic and Volatile Matter.....	38.6	2,238.
Colloidal Matter.	0.8	46.
Calcium Chloride (Strontium Chloride).....	41.2	2,489.
Magnesium Chloride.	16.3	945.
Barium Chloride.	0.025	1.
Barium Bicarbonate.	0.056	3.
Ammonium Chloride.	3.2	185.6
Sodium Chloride.	120.0	6,960.
Potassium Chloride.	0.015	0.8
Lithium Chloride.	Trace	Trace
Sulphates.	Trace	Trace
Carbon Dioxide in Solution.....	0.17	9.

In this brine there is 12 per cent of sodium chloride and 4.12 per cent of calcium chloride. By diluting it with five volumes of fresh water we get a water which contains 2 per cent sodium chloride and 0.68 per cent calcium chloride. By using one volume of this brine and six volumes of fresh water, we get a water which contains 1.71 per cent sodium chloride, and 0.58 per cent calcium chloride.

By varying the dilution and by adding carbon dioxide gas by artificial means we are able to employ carbonated brine baths of suitable strength for the treatment of chronic heart disease. The patient is immersed in

the bath, the temperature of which is varied according to well-known indications, for a period varying from four to fifteen minutes, he is then carefully dried and required to rest in bed for one hour. The baths are given on alternate days, so that a full course requires six weeks.

The effects to be expected following the carbonated brine baths in a case of cardiac incompetency are (1) diminution in the size of the heart, (2) slowing of the pulse, (3) reddening of the skin, (4) slowing of the respiration, (5) reduction in the size of the liver, if that organ is the seat of a passive congestion, (6) improvement in the muscular quality of the systolic sound of the heart, (7) the disappearance of a hemic murmur or of a murmur due to dilation of an orifice, and (8) increase in the intensity of an organic murmur dependent upon valvular defect or deformity.

As an example of the diminution of the size of the heart following a course of these baths, the case of a male, aged sixty-three years may be referred to. The patient presented a dilation of the heart following the sudden strain of helping to lift an automobile. When first seen the cardiac dulness extended from the third rib to the fifth interspace and from the right edge of the sternum to one and one-half inches outside the midclavicular line, a transverse diameter of eight and one-half inches. After the completion of the treatment the cardiac dulness extended from the third rib to the fifth interspace, and from the right edge of the sternum to one-half inch outside the midclavicular line, a transverse diameter of seven and one-half inches.

In another case, that of a male, aged fifty-two years, presenting mitral regurgitation, hypertrophy of the heart, and dilation of the heart, the dulness before the institution of treatment extended from the fourth rib to the seventh interspace, and from the right edge of the sternum to 1 inch outside the midclavicular line; a transverse diameter 8½ inches. After the completion of the course of baths the cardiac dulness extended from the fourth rib to the seventh interspace and from the right edge of sternum to ½ inch outside the midclavicular line. Transverse diameter 8 inches.

The accompanying figures are submitted to show the effect of the baths on the pulse rate. The patient was a female, aged sixty-five years, who had hypertrophy with dilation of the heart, accompanied by an extensive chronic bronchitis and chronic dry pleuritis.

Number of Bath.	One Hour			
	Before.	During.	After.	After.
8.	103	90	98	79
9.	107	80	93	80
10.	100	80	78	74
11.	98	80	84	72
12.	94	75	82	70
13.	89	70	76	73
14.	101	88	98	91

15.	70	65	71	76
16.	85	75	77	77
17.	80	75	81	76
18.	76	70	86	74

In the case of a male, aged thirty-six years, who had mitral regurgitation and aortic regurgitation, the accompanying figures were obtained:—

Number of Bath.	Before.	During.	After.
1.	108	100	100
2.	116	96	100
3.	102	96	94
4.	110	106	96
5.	100	96	88
6.	96	92	88
7.	90	84	82
8.	94	96	86
9.	92	92	80
10.	92	86	84
11.	84	84	84
12.	90	86	80
13.	84	82	84
14.	90	88	84
15.	90	88	84
16.	92	90	78
17.	100	100	84
18.	90	86	84

In the case of a male, aged seventy years, who had dilation of the heart with myocarditis, the liver dulness before the baths extended from the fifth interspace to the costal margin; the edge of the organ was palpable. At the conclusion of the treatment the liver dulness extended from the sixth rib to the costal margin. The edge of the organ was not palpable on deep inspiration.

In the case of a male, aged sixty-eight years, who had hypertrophy of the heart, with fibroid myocarditis and mitral regurgitation, the liver dulness before the baths extended from the fifth interspace to one inch below the costal margin; the edge of the organ was palpable but not tender. After the baths the liver dulness extended from the fifth interspace to the costal margin; its edge was palpable but not tender.

In the case of a male, aged thirty-six years, who had mitral regurgitation and aortic regurgitation, the liver dulness before the baths extended from the sixth rib to the costal margin; its edge was palpable, but not tender. After the baths the liver dulness extended from the sixth rib to the eighth interspace; its edge was not palpable and there was no tenderness.

The effect of the carbonated brine baths on cardiac adventitious sounds is dependent upon the influence of the baths on the cardiac musculature. The muscle is improved in its functional capacity, it contracts more slowly,

with more of that element which gives the muscular quality to the systolic sound, and, if the organ has been stretched the dilatation is lessened. If a murmur is pericardial we would expect it to become louder with improvement in the contractile force of the heart muscle. If the murmur is due to chronic valvulitis with thickening and deformity we would expect the increased force of the contracting muscle to increase the intensity of the murmur and to make its transmission better defined.

If the murmur is dependent upon dilation of one of the orifices of the heart the improvement of the muscular wall of the organ with diminution of dilation should cause the murmur to disappear. A hemic murmur should disappear.

We consider that the muscular quality of the systolic sound of the heart is an important indication of the functional capacity of the myocardium. In a heart which produces a full toned "lub" as the characteristic systolic sound we may assume that the contraction is energetic and competent. On the other hand, any diminution in the quality of this sound indicates a weakness in the contraction and a lack of competency on the part of the myocardium. The interpretation of the character of the systolic sound is, of course, dependent upon the training of the ear of the examiner, and is subject to the influence of the personal equation to a very great extent, except in the extremes of weakness.

The chief indication for the use of carbonated brine baths in the treatment of chronic heart disease is in cases of myocardial insufficiency with low blood pressure. In such cases we expect to get a slowing of the pulse, an increase in the muscular quality of the systolic sound of the heart, and an increase of blood pressure. If, in addition, there be dilation of the heart due to loss of tone of the muscle, we expect to see the transverse diameter of cardiac dulness reduced. If the dilation affects the mitral ring so that there is a functional insufficiency of the mitral valve with the production of a soft systolic murmur transmitted into the axilla, we expect that murmur to disappear with the contraction of the heart to more nearly its normal size and with improvement of the tone of the myocardium.

In cases of myocardial degeneration following the compensatory hypertrophy dependent upon valvulitis we look for little or no change in the area of cardiac dulness outlined by percussion, but with improvement of the muscular tone we expect the valvular murmur to increase in loudness and distinctness and in definiteness of transmission. We look upon the increase in the murmur to be indicative of improved functional capacity of the heart.

In cases of parenchymatous myocarditis following the acute infectious diseases, the hydrotherapeutic treatment should improve the muscular quality of the systolic sound, raise the blood-pressure, and slow the pulse.

In cases of nervous and functional disorder of the heart, the carbon-

ated brine baths sometimes are productive of benefit and sometimes fail. If the disturbance is dependent upon toxic or reflex influences, the treatment is likely to be futile unless the reflex or toxic cause is first removed.

In cases of fibroid myocarditis with high blood-pressure and evidence of general arteriosclerosis, carbonated brine baths, if given at all, should be very carefully watched and should be stopped if the symptoms of high blood pressure increase: tinnitus, vertigo, precordial pain, headache, full, strong, incompressible pulse. Usually in such cases the temperature of the baths should be kept at or above 98° F., the stronger brines should not be used, and the carbon-dioxide gas should be omitted.

In cases of fat heart, treatment with cold carbonated brine baths is best omitted, provided the myocardium is in good condition. Treatment calculated to reduce the weight of the patient and to improve his general metabolism, combined with a general obesity diet, should be instituted.

Carbonated brine baths are contraindicated in cases of advanced arteriosclerosis, chronic nephritis, thoracic and abdominal aneurysm, and in the terminal stages of broken compensation with edema.

In cases of nephritis the cautious employment of the weaker brines, warm, without carbon dioxide, alternating with some form of eliminative treatment, such as the electric light bath or the vapor cabinet bath, may be tried with close watchfulness. Particularly should the percentage of albumin in the twenty-four-hour specimen of urine be determined daily. If, however, the pulse increase in rate, albumin increase in percentage, edema increase in amount, the brine baths should be discontinued and dependence be placed on eliminative treatment, rest, diet, and digitalis.

The cases of arteriosclerosis should be handled in the same way. If the blood pressure increase in the brine baths they should be discontinued.

In cases of the terminal stage of broken compensation the effort necessary on the part of the patient to get into and out of the tub will be productive of deleterious results.

Accessory hydrotherapeutic and mechanotherapeutic procedures.—In cases complicated by acute, subacute, or chronic bronchitis or pulmonary congestion much benefit is obtained by alternating the carbonated brine bath with a vapor bath into which the brine of the Nauheim spring is sprayed. A specially constructed room is prepared into which steam is led in such a way that the brine is sprayed into the compartment in an intimate mixture with the steam. The patient sits in a reclining chair, with a cold towel about his head, and breathes the air saturated with moisture and impregnated with the finely divided saline ingredients of the brine. Such a treatment is also of value in cases of acute and chronic laryngitis accompanying chronic cardiac disease.

After the diseased myocardium has had a chance to recuperate partially from the strain put upon it by the ordinary or the extraordinary demands of the daily habits of an individual patient, in order to put it in a condi-

tion to perform its function in as nearly as possible a normal manner, it is wise to undertake to provide for the exercise of the muscle under careful supervision.

The principle involved is the same as that concerned in the development of a skeletal voluntary muscle; exercise of the muscle to be developed. It is known that exercise in a normal individual increases the heart rate and hence carefully regulated exercise is the method to be adopted for improving the tone of the cardiac musculature.

Two methods are available; that of Schott, known as *Resistance Exercise*, and that of Oertel, known as *Hill Climbing*.

In the former the patient is required to make certain movements with his arms and legs against resistance applied by an attendant.

There are, all together, eighteen exercises employed and the degree of resistance varies with the character of the pulse; at first it is slight, but as the strength of the myocardium improves it is increased. After each movement the patient rests for thirty seconds or a minute.

In the later the patient exercises his myocardium by walking on hills the degree of elevation of which is known, the distance is known; and opportunity for rest is provided at suitable intervals.

At The Glen Springs we employ the following routine distances and grades: one-sixth mile, elevation twenty-three feet; one-fourth mile, elevation forty-three feet; one-fourth mile, elevation sixty-six feet; one-half mile, elevation one hundred and thirteen feet; two-thirds mile, elevation one hundred and six feet; four-fifths mile, elevation one hundred and thirty-six feet; three-fifths mile, elevation one hundred and thirty-six feet; two-thirds mile, elevation one hundred and forty-six feet; five-sixths mile, elevation one hundred and sixty feet; seven-eighths mile, elevation one hundred and ninety-three feet.

The best results are obtained when these methods are adopted after the course of carbonated brine baths is finished. In cases, however, in which it is advisable to get a patient back to his daily routine at the earliest possible moment they may be begun at the end of the second week of treatment with the baths, provided the cardiac action will allow it, and carried along on the alternate days, until the end of the six weeks.

Diet.—During the administration of a course of carbonated brine baths the patient should be given a mixed diet of easily digested and readily assimilated constituents with a caloric value of at least 2500. It is unnecessary to make any great restriction or to deprive a patient of articles of diet to which he is used, and of which he is fond, unless they are distinctly harmful. The accompanying list is used at present at The Glen Springs:—

Milk or buttermilk, two pints a day.

Zwieback, whole wheat bread, graham bread, or buttered or milk toast.

Soft boiled eggs, poached eggs, scrambled eggs.

Roast beef, lamb, mutton, chicken or turkey.

Broiled steak or chops.

Baked, broiled or boiled fish without sauce; but no fried fish.

Spinach, string beans, tomatoes, oyster plant, boiled rice, baked potatoes, stewed celery, endives, peas, asparagus, cauliflower, lettuce with Mayonnaise or French dressing. Cream cheese.

Rice pudding, baked custard, tapioca, corn starch pudding, ice cream, stewed prunes, apple sauce, baked apple, preserved peaches, stewed figs.

The patient should not eat:—

Fried food of any kind.

Hot bread or griddle cakes;

Goose, duck, or guinea hen;

Pork or veal in any form;

Rhubarb, cabbage, parsnips, turnips, carrots;

Salt or smoked fish;

Cheese, except cream cheese as already specified;

Fancy desserts;

Entrees, sauces and gravies.

We wish to say a word of caution to physicians who send patients to sanatoria for the hydrotherapeutic and mechanotherapeutic treatment of cardiac disease. It is very unwise to allow the patient to think he can hurry through his baths and return to his customary work in a short time. Usually the patient has been burning his candle at both ends for a long time and he needs to take the full course. Not one day short of six weeks, but preferably ten weeks' treatment is advisable.

It is a mistake to encourage patients with myocardial changes to expect to receive some kind of treatment three or four times a day. A carbonated brine bath on one day, perhaps general massage on the alternate day, with short walks on a level path, accompanied with quiet and relaxation in the open air are attended with the best results. The patient who jumps about from one treatment to another, dressing and undressing three or four times a day, does himself more harm than good.

THE RELATION OF THE TONSILS TO HEART DISEASE.

By ALBERT HENRY BEIFELD, M. D., of Chicago.

Although it is only within recent years that disease of the tonsils—the most important organs of the Waldeyer lymphatic ring—has been associated etiologically with infections of the heart and its membranes, occasional observations were made as early as 1865. Fernet,¹ at that time noted the occurrence of an “rheumatic pharyngitis” and classified “rheumatism of the throat” as part of the rheumatic syndrome, by virtue of which fact he became one of the first to bring to notice the relation of tonsillitis to acute heart disease, Bouillaud² having established the inevitable connection of rheumatic fever and endocarditis and pericarditis. Lasègue,³ saw in the nature of the tonsillitis, with its suddenness of onset, an intensity of local discomfort all out of proportion to the visible signs of the disease, the probability of a following rheumatism.

These communications do not seem to have attracted much attention at the time,—surely not outside France,—since one of the first English clinicians to have published similar observations was Kingston⁴ in 1880. After him, however, the publications have multiplied until at the present time the relationship between these two conditions has been quite generally accepted. Still it requires no more than a cursory perusal of the monograph on rheumatism by MacLagan in the “Twentieth Century Practice” (1895), classified under Nutritional Diseases, to see that there were some who were slow to recognize this coincidence; for, in the 140 pages given over to the discussion of complex theory of origin, clinic, and treatment of this ailment, nowhere is mention made of the tonsil as a possible atrium of infection.

In Germany, strange to say, recognition of the relationship between these two infections did not take place until considerably later, the first reports⁵ being said to have appeared in 1892. Henoeh,⁶ in his chapter on rheumatism, casually remarks the incidence of an occasional preceding tonsillitis. Roos⁷ reports 2 cases and lays stress on the fact that this important element has been neglected. Singer⁸ in 1897 states that of 66 cases of acute articular rheumatism, 26 were preceded by tonsillitis.

As later researches have clearly proved that endocarditis may be caused by the various pyogenic micro-organisms as streptococcus, pneumococcus, staphylococcus, gonococcus, etc., it remained merely to establish the identity of the organism of rheumatic endocarditis. The bacillus of Achalmé has not been found by other investigators; in its place there has been isolated from cases of rheumatism a diplococcus, which seems to stand some-

where between the pneumococcus and the streptococcus. Mantle, Klebs,⁹ Singer and Loeffler have done the pioneer work in this field. Poynton and Payne,^{10 11 12} have been the latest to hold to a distinct organism as the cause of rheumatic fever, and, besides cultivating it from the blood of patients suffering with rheumatic fever, have also isolated it from the tonsils of such patients. Triboulet and Coyon¹³ in 1898 produced mitral disease in rabbits by the injection of an organism cultivated from the blood of a patient suffering with acute articular rheumatism, as did Poynton and Payne. Cole,¹⁴ however, was able to produce similar results with the streptococcus and concludes that this organism is the infecting agent.

Study of the tonsil flora has thrown some light on this knotty problem. While Poynton and Payne have found their "micrococcus rheumaticus" on the tonsils, other observers, recognizing that there is much variation of strain, have been willing to identify the cocci found as streptococci. Ruediger,¹⁵ found the streptococcus pyogenes in small numbers in 60 per cent. of apparently normal throats, and, constantly in great abundance in the throats of patients suffering from scarlet fever and tonsillitis. Davis¹⁶ in a careful study of tonsils removed from 45 cases of endocarditis, etc., found that the crypts in almost all cases yielded the streptococcus in pure or almost pure culture, while on the surface the pneumococcus predominated. The virulence of the organisms was evidenced by the production of endocarditis and arthritis on intravenous and intracardiac injection of animals. Interestingly enough, a pneumococcus produced mitral endocarditis in a rabbit, although no heart lesion existed in the patient from whom the coccus was obtained.

The nature of the tonsillitis preceding rheumatic disease is described by most authors as showing a marked degree of injection, and but rarely any pus formation; in other words, such an inflammation as we should expect to be caused by an organism of the streptococcus type. Bachhammer,¹⁷ in 37 post-mortem examinations of cases of septic and chronic recurring and verrucous endocarditis, found the most varied pathological changes in the tonsils, such as pus in the crypts, old purulent and gangrenous tonsillitis, and scars of old lesions. The failure to make control observations, however, weakens the object of the investigator in trying to demonstrate the obligate connection of the lesions and disease of the heart, and of other organs. Guerich,^{18 19} in several interesting communications, has put forth the view that the crypts are the seat of a chronic inflammation, and to this he has applied the term "chronic fossular angina." He believes that lacunæ harbor pathogenic bacteria which may at intervals infect the body through the lymph or blood-stream, reaching the endocardium via the coronary vessels.²⁰ According to his views most individuals have this form of angina; from which source they become infected when for some reason the resistance is lowered.

That bacteria may pass through the intact epithelium is seen in the

work of Stohr.²¹ Grober²² calls attention to the fact that in the act of swallowing, the increased pressure on the tonsils may be an accessory factor in forcing bacteria into the body of the tonsils. Thence, they travel to the regional lymph glands or they may also be caught in the blood-stream and thus enter the general circulation.

At this point a slight digression may be permissible to call attention to the recent views as to the functions of the tonsils. Levinstein²³ reviews the literature, and concludes that the view that these organs play a rôle in the protective mechanism against infection is the most probable one. Good,²⁴ without adducing the slightest evidence of a scientific nature, declares that the early immunization of the individual against infection of the upper respiratory tract is the chief function of the tonsils. However plausible such an explanation may sound, it cannot claim credence, supported as it is by the mere statement of its sponsor.

The difficulty experienced by earlier investigators in isolating an etiological organism in these cases, led to the idea that Toxines might be responsible for the manifestations of rheumatism and endocarditis. Such views are presented by Chvostek and Singer.²⁵ The experiments of Fulci,²⁶ however, seem to show conclusively that injections of the most varied bacterial and other toxines, as well as of nucleoproteids and dead bacteria, even when the heart valves were injured, were incapable of producing endocarditic changes.

While the literature abounds in articles on rheumatism, rheumatic endocarditis, chronic ulcerative endocarditis and pericarditis, it is noteworthy that in but few of these is a serious attempt made to establish the fact of the tonsils being or not being the portal of entry of the infection. Poynton²⁷ finds sore throat in 10 (23 per cent.) of 43 cases of rheumatism in children under five years of age, and in analysing 100 cases of suppurative pericarditis takes no account of the possibility of the tonsils being the source of infection. Osler,²⁸ in 10 cases of chronic infectious endocarditis, notes the pre-existence of tonsillar inflammation in but one case, and is satisfied with the mere mention of the fact that there was a history of rheumatism in childhood in 5 cases. Horden,²⁹ in analysing 150 similar cases, states that 72 gave a history of rheumatism, but does not regard the question of tonsillar infection of sufficient importance to refer to it. Ræger,³⁰ on the other hand, noted that in a series of observed cases of tonsillitis 8 per cent. were followed by permanent valvular lesions, without the occurrence of an intermediate rheumatism. Packard³¹ also early reports 5 cases of endocarditis following tonsillitis. Rachford³² describes a case in which, after repeated attacks of tonsillitis, scarlet fever developed with especially severe throat symptoms. Two months after the onset of the disease, a severe tonsillitis recurred and following hard upon it, septic endocarditis which led to the death of the patient. Pearson³³ had a case of streptococcal pericarditis (and colitis) following tonsillitis. Billings,³⁴ in 14 cases of chronic infectious en-

docarditis, was able to establish the tonsils as the atrium of infection in 2 of them. Thiis,³⁵ in a statistical study, found that in 288 cases of rheumatic arthritis, 19 per cent. had had previous tonsillitis, while of 258 cases 15 per cent. developed endocarditis, pericarditis, or both.

As early as 1884, Blyckærts³⁶ advocated the use of sodium salicylate in the prodromal affections of acute arthritis. Since then, as the salicylates have established for themselves a distinct place in the therapy of the rheumatic syndrome, there has grown the feeling that they are of service in diminishing the severity of ensuing cardiac complication. As, however, no convincing proof of this has been brought forward, they are administered on purely empiric grounds. Some attempts at prophylaxis and local antiseptic treatment of the buccal cavity have of course been made, as, for instance, the use of guaiac preparations by Zeuner.³⁷ Paraldehyde troches are also enjoying vogue. Campani³⁸ believes that the brushing the teeth, gums, and tongue each night with sodium bicarbonate will prevent the tendency to recurring tonsillitis. Melzi³⁹ urges the administration of brewers' yeast in sweetened milk. Wadsworth⁴⁰ showed in experiments that alcohol was the only efficient antiseptic against the resistant pneumococcus.

Such methods are of avail, of course, only in attacking the surface micro-organisms. It remained for Guerich⁴¹ to introduce the interesting—if radical—treatment of actually removing the tonsils in all cases of acute articular rheumatism and, indeed, at the first signs of the disease. His methods were quite crude as compared with the simpler enucleation of the present day, a fact which he then realized, especially when he emphasized the disadvantage of tonsillotomy. The idea of removing the tonsils during the height of an acute febrile disease—a grave infection—has not commended itself to the general mind. The author himself calls attention to the "reaction" following the operation and calls it an "experimentally produced articular rheumatism." He does not consider it of the slightest serious import, even though it may last as long as four days. According to the enthusiastic reports of this country practitioner, the course of all cases is, except for the reaction, materially shortened. If this be true, we may assume that the likelihood of cardiac complication would likewise be distinctly diminished. Schichhold⁴² praises this therapy, applying it with discrimination and apparently preferring the more conservative procedure of slitting the crypts in certain cases. Curschmann⁴³ also is impressed with the possibilities of the method. Prym⁴⁴ was one of the first to apply the Bier-Klapp suction method to disease of the crypt. Levinstein⁴⁵ finds that in cases of chronic recurring tonsillitis the searing of the affected crypts with the pointed galvano-cautery (introduced by Voltolini) will often in the most surprising fashion put an end to the infection, even after all other methods have failed. The fact that one treatment will not infrequently suffice causes him to read much good in this relatively simple and harmless intervention.

It would be superfluous to review the literature on the numerous methods of complete enucleation of the tonsils, at present the operation of choice of the American operator. Suffice it to say that the tonsils are at present most often removed because they are enlarged, rather than because when infected they become a grave menace to the individual. There does not seem to be as yet a crystallized opinion that tonsillectomy should be urged as a prophylaxis against cardiac disease.

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THE NEWER HEART REMEDIES.

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In 1874 Schmiedeberg¹ published his method for the isolation of digitalin and digitoxin. His work was hailed with delight by the medical world, for it was hoped that the use of the active principles in the pure state would put an end to the uncertainty of digitalis medication. But the pure drugs did not find favor with the practising physicians; their clinical experience seemed to show that the new drugs did not produce the true digitalis effect obtainable from the old leaf preparations; and although the greater certainty of dosage was felt to be a very valuable factor in the treatment of heart disease, the advantage gained by more accurate dosage was not sufficient to overcome the inefficiency of action, and practitioners therefore returned to tincture and infusion. In the years 1891 to 1894 Schmiedeberg and his pupils carried out a series of careful researches on the pharmacology of digitalin and digitoxin, and, as a result of this work, Schmiedeberg recommended digitalin as a complete substitute for the galenical preparations of digitalis. Again clinical experience differed with that of the laboratory, and although digitalin was more widely used than previously, it could not replace the preparations made directly from the crude drug.

The problem for the chemist and pharmacologist, therefore, was not to isolate active principles, but to improve the whole drug preparations, to produce efficient and permanent leaf powders, or extracts, of known strength and free, as far as possible, from gastro-enteric action.

With this end in view, Golaz,^{2 3} a Swiss apothecary, dialyzed macerations of fresh digitalis leaves first with water and then with aqueous solutions of alcohol in gradually increasing concentration; the process of dialysis lasting fourteen days. Golaz used the utmost care in the selection of his leaves, he collected them in one locality only, taking nothing but the second year's growth and gathering the leaves on bright sunny days so as to insure a minimum of moisture content; he also controlled his product by chemical analysis. By this method Golaz hoped to obtain dialysates of uniform action and free from irritating leaf constituents. The chemical analysis of the dialysates indicating that the product was of uniform strength, Golaz submitted his samples to Prof.

Jaquet for pharmacological verification. Jaquet found, however, that different samples of dialysate differed very widely in physiological action, but by concentrating dialysates which were too weak, *in vacuo*, and diluting those which were unusually strong, Jaquet found it possible to produce preparations of uniform physiological strength.

The dialysates of Golaz are excellent preparations as long as they are fresh; they are readily absorbed and are borne well by the stomach, but unfortunately, they are not permanent.

Jaquet's results stand as excellent proof of the fact that chemical standardization is of no value when digitalis products are concerned. Many other authors who compared chemical with physiological standardization obtained results similar to those of Jaquet. Thus Barger and Shaw⁴ could isolate only one-third of the digitoxin which by physiological analysis was shown to be present in a sample of tincture of digitalis. In another experiment these authors added a known amount of digitoxin to an artificial tincture and succeeded in recovering only one-fourth of the added drug. It is quite obvious, therefore, that in the case of digitalis other than physiological standardization is out of the question.

Of recent years physiologically standardized tinctures and infusions (digitalone, strophanthone) have come more and more into use. When these preparations have been recently standardized they are, of course, vastly superior to the ordinary tincture of unknown strength. But tinctures prepared according to the directions of the pharmacopeia, with dilute alcohol, deteriorate very rapidly, and their standardization is really a waste of time. In order to insure permanence in a tincture it must be prepared with 70 per cent. alcohol. Worth Hale⁵ examined a number of such tinctures and found that they showed practically no deterioration in strength in the course of eight years.

Tinctures prepared with 70 per cent. alcohol and afterwards carefully standardized may be used, therefore, to carry out accurate and uniform digitalis medication. Such tinctures, moreover, represent a purer product than the ordinary pharmacopeial tincture, since the concentrated alcohol, which is used, removes by precipitation a large portion of the useless resinous material. An infusion cannot be made permanent; infusions are not a necessary preparation; and for the sake of accurate dosage it will be better to omit them entirely.

The Germans have always shown a preference for the dried and powdered leaf; it is only natural, therefore, that many German investigators should have attempted to improve the drug in this form. We owe it to the work of Focke,⁶ Siebert,⁷ Ziegenbein⁸ and others that to-day permanent and uniformly active preparations of the powdered leaves may be bought in the market.

Standardized, permanent tinctures and leaf powders fulfil, however, only one of the qualifications of the ideal digitalis preparation; such a preparation besides being of known physiological activity, should not pro-

duce gastro-enteric irritation and should be prompt and efficient in action without exposing the patient to the danger of cumulative poisoning. The gastro-enteric irritation of tincture and powdered leaf are only too well known to practitioners; at times this most undesirable feature of their action makes it impossible to carry digitalis medication to its logical end, the stomach of a patient with heart disease being as a rule particularly sensitive to irritant drugs. This fault cannot be corrected in the tincture as such. In the case of the powdered leaf this purpose has, however, been accomplished by the use of gelatine capsules hardened in formaldehyde.

Sahli found that whereas the ordinary gelatine capsule is dissolved in from five to fifteen minutes by the gastric juice, a capsule hardened in formaline will resist gastric digestion for four or more hours. This discovery led to the introduction of Sahli's well-known "desmoid" capsules. In attempting to use the Sahli capsule for the purpose of administering drugs which caused irritation of the stomach, Rumpel noticed that substances soluble in water were slowly leached out of the "desmoid" capsule long before the capsule itself was dissolved. This was due to the swollen condition of the capsule, which acted as a sort of dialyzing membrane. By using an alcoholic solution of formaldehyde instead of formaline, Rumpel⁹ obtained a capsule which resisted gastric digestion longer than the "desmoid" capsule, without permitting any part of its contents to pass into the stomach. A German pharmaceutical house¹⁰ is now dispensing over 200 different drugs in these capsules of hardened gelatine (trade name: "Gelodurat Capsules"), and among these is a capsule containing digitalis leaf powder prepared and standardized according to the method of Caesar and Loretz (Fol. digit. titrata). These capsules have been employed in a number of cases at the Massachusetts General Hospital and in the private practice of one of us; they have never caused gastric disturbances. As an inexpensive preparation of digitalis which is of known strength, permanent and non-irritating to the stomach, these capsules deserve, we think, to be used very widely. They exhibit, of course, the disadvantage of slow and rather uncertain absorption, which we have found to be characteristic of the powdered leaf. The variation in physiological activity of the leaves from year to year is, moreover, so great that such capsules, to remain of uniform activity, will of necessity fluctuate considerably in size. The only alternative is to designate the physiological strength of the capsules on each package dispensed, a proceeding which would be apt to confuse the general practitioner.

In 1904 Cloetta¹¹ published his first paper on "Digalen" or "Digitoxinum solubile." Cloetta's preparation was welcomed by the medical profession as the first digitalis extract suitable for hypodermic application. It was soon found, however, that digalen is entirely unsuited for hypodermic and intramuscular use, since its application causes pain and is followed in a large number of cases by serious local reaction.¹² For

use by mouth, too, it offers no advantage over the galenical preparations. If it really contains digitoxin, it is open to all the objections which apply to the use of digitoxin in any form; as a matter of fact, Kiliani,¹³ who knows more about the chemistry of digitalis than any other living person, feels convinced that the active substance in digalen is not digitoxin, but impure digitalein, a body closely related to digitalin, but more soluble than the latter. In support of this view, Focke¹⁴ was able to show that digalen, which is advertised to contain .3 milligram of "soluble, amorphous digitoxin," is only one-fourth as strong as .3 milligram of "difficultly soluble" crystalline digitoxin, on the one hand, and a simple infusion of fresh macerated leaves (containing .25 milligram digitoxin), on the other. Focke,¹⁵ Worth Hale¹⁶ and the writers have found, moreover, that digalen is by no means constant in physiological action; various samples tested showing a material difference in strength. The clinical literature shows that digalen does not act any more promptly than do the ordinary galenical preparations made from good leaves¹⁷; it shows further that digalen exhibits a great tendency to cumulative action¹⁸; that the toxic dose is very near the therapeutic dose¹⁹; that the drug will cause nausea and vomiting to the same extent as the old preparations²⁰; in short, that the drug cannot in any way be considered a desirable addition to our stock of cardiac remedies. Worth Hale²¹ carried out a careful comparative research on digalen, digitoxin and digitalein, which is thoroughly convincing and which we would advise every investigator of heart remedies to read.

In a recent paper one of us²² reported on the clinical use of another new preparation of digitalis—namely, digipuratum. This preparation, which is a purified extract of digitalis, seems to approach more nearly to the ideal drug than any of its predecessors. Digipuratum is constant in action, it is permanent (a powder in our possession was found not to vary in strength from May, 1910 to May, 1911), it does not cause gastro-enteric disturbance (over 200 cases, Massachusetts General Hospital), it shows less tendency to produce cumulative intoxication than any of the other preparations of digitalis, and it is prompt and reliable in action. It has one great fault; it is very expensive compared to other preparations. But the method of manufacture and physiological assay of the drug is a most expensive one. We must be prepared in the future to pay well for preparations of this kind, which tend to make medicinal treatment more exact and more reliable, and which are helping to make clinical medicine a science.

The digitalis preparations discussed so far are all designed for internal use, and their action manifests itself at best in the course of from twenty-four to thirty-six hours. There are times when a heart stimulant, to save life, must act within a few hours, and it is just such a stimulant that chemists and pharmacologists have been trying for years to obtain. The first of this group to be of practical value was strophanthin, the

active principle of *strophanthus hispidus*. One of us introduced this drug into America four years ago,²³ and it has since been used to a certain extent, especially in hospitals. Strophanthin must be given intravenously, since its hypodermic application causes most intense pain and considerable local disturbance. If it is given intravenously with proper technique it acts as a wonderful cardiac stimulant, and its use is absolutely free from untoward actions of any kind. It may be safely said that if strophanthin fails to produce the desired effect, the heart of the patient is beyond digitalis—like stimulation. Strophanthin is also indicated in conditions of hydremia when absorption from the gastro-intestinal tract is reduced to a minimum on account of the water-logged state of the system. In such cases large amounts of digitalis given by mouth have no effect, the greater part of the drug is excreted unabsorbed and the accumulation of water in the system continues. Strophanthin given intravenously acts directly upon the heart, with the result that efficient diuresis occurs within twelve to twenty-four hours. The system which has been depleted of its excessive water-content is then in a condition readily to absorb digitalis preparations given by mouth. There is a class of cases which responds better to strophanthin action than to that of digitalis. In these cases strophanthin may be given intravenously for a period of days or for a week, and the results obtained in this way are incomparably better than either from digitalis or *strophanthus* by mouth. It may be said in general that *strophanthus* therapy by mouth is unsatisfactory; the reasons for this are not apparent, since the pure drug could be given, and the great uncertainty of *strophanthus* preparations avoided. It would seem that a considerable portion of the pure strophanthin given by mouth is either very quickly excreted before it can be absorbed or is destroyed before absorption.²⁴

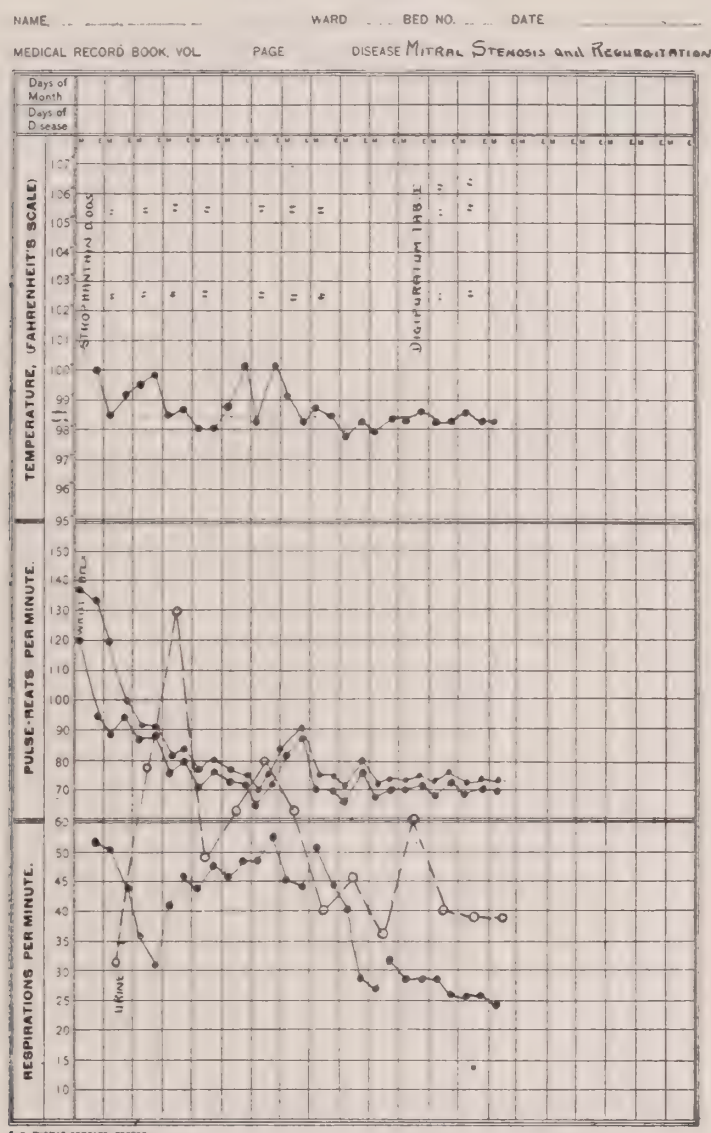
Case 1, the chart and brief history of which is reproduced in the text, offers a good example of the cases which are particularly suited to intravenous strophanthin therapy. As may be seen from the chart, this patient received on eight successive days half a milligram of strophanthin directly into the blood. The strophanthin diuresis and the effect on the radial pulse and apex beat are very striking.

Case 2 is illustrative of a class of cases, which, though hopeless from the first, require cardiac stimulation to keep them free from suffering to the end. In this case, digitalis by mouth had failed to give the patient relief and strophanthin was given intravenously as *ultimum refugium*. It is interesting to note the approach of radial and apex beat after the first two injections.

Intravenous medication is not popular with the general practitioner, and perhaps it is just as well that it should be so, since the injection of active substances directly into the blood is always a more serious procedure which is best confined to hospital and consultation practice. For general practice we need a preparation which may be given hypodermically or

intramuscularly. Until very recently there was no preparation suitable for this purpose, although many have been tried. A few months ago the manufacturers of digipuratum placed at our disposal a number of sealed and sterilized glass ampules, each of which contain .1 gm. (gr. $1\frac{1}{2}$) digipuratum dissolved in 1 c.c. of a solvent (probably 1 per cent.

CLINICAL CHART



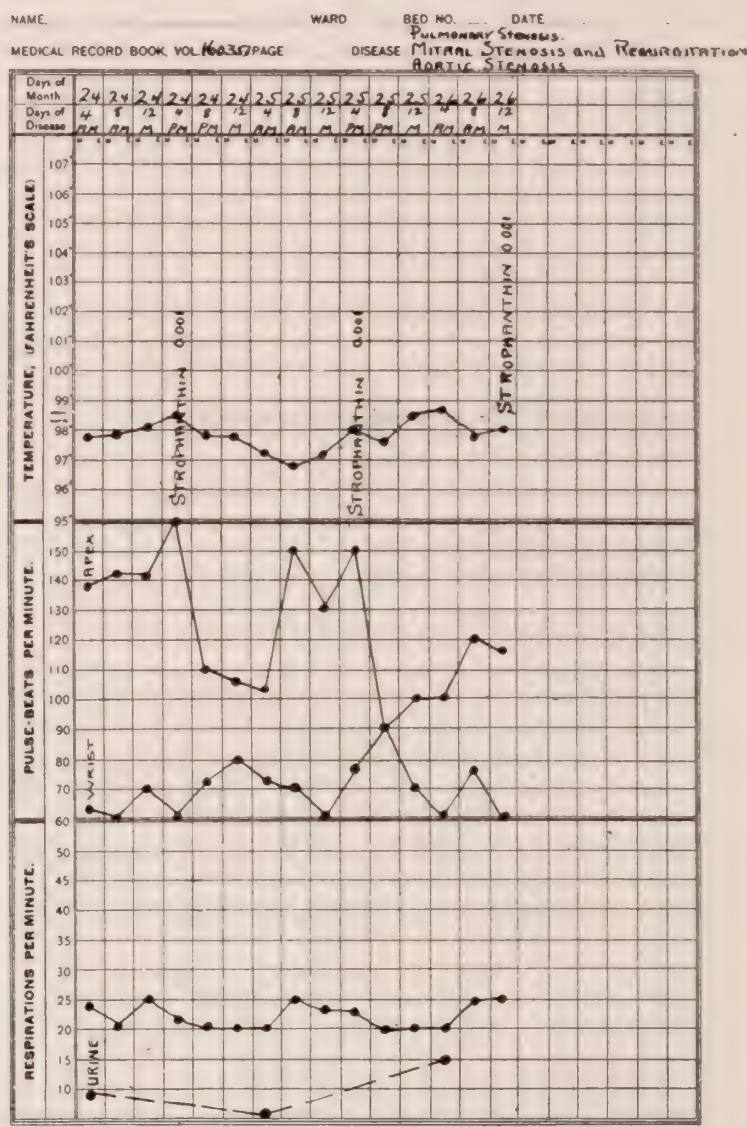
Case 1.—*Mitral stenosis and regurgitation*. Third break in compensation. Cyanosis, dyspnea, rapid very irregular heart. Marked discrepancy between apex and radial pulse-beats. Passive congestion of liver—no other edema. Marked relief from dyspnea after first dose of strophanthin, progressive improvement.

At discharge: Liver apparently normal, no dyspnea, heart almost regular, nearly all beats transmitted to wrist. Patient has been in hospital twice before for broken compensation—treated once with tincture digitalis, once with digipuratum; improvement with strophanthin more marked than with other drugs.

Na_2CO_3 solution). We have given this solution both intravenously and hypodermically with good results, but we were particularly interested in its applicability for hypodermic use, which is of such great importance to the general practice of medicine. The digipuratum solution did not produce pain or local inflammatory reaction in any of the cases. The

digitalis effect appeared in some cases within an hour, while in other cases a number of hours elapsed before this effect became evident. The injection of $1\frac{1}{2}$ grains (the contents of one ampule) was repeated twice the same day in some cases, but as a rule one or two injections in all were sufficient to prepare the way for medication by mouth. The

CLINICAL CHART



Case 2.—*Fibrous and verrucose endocarditis* of mitral, aortic and pulmonary valves with stenosis. Chronic adhesive pericarditis (slight). Cardiac hypertrophy and dilatation. Large pulsating liver, general anasarca, ascites, hydrothorax and hydropericardium.

First dose of strophanthin followed by marked temporary improvement in symptoms.

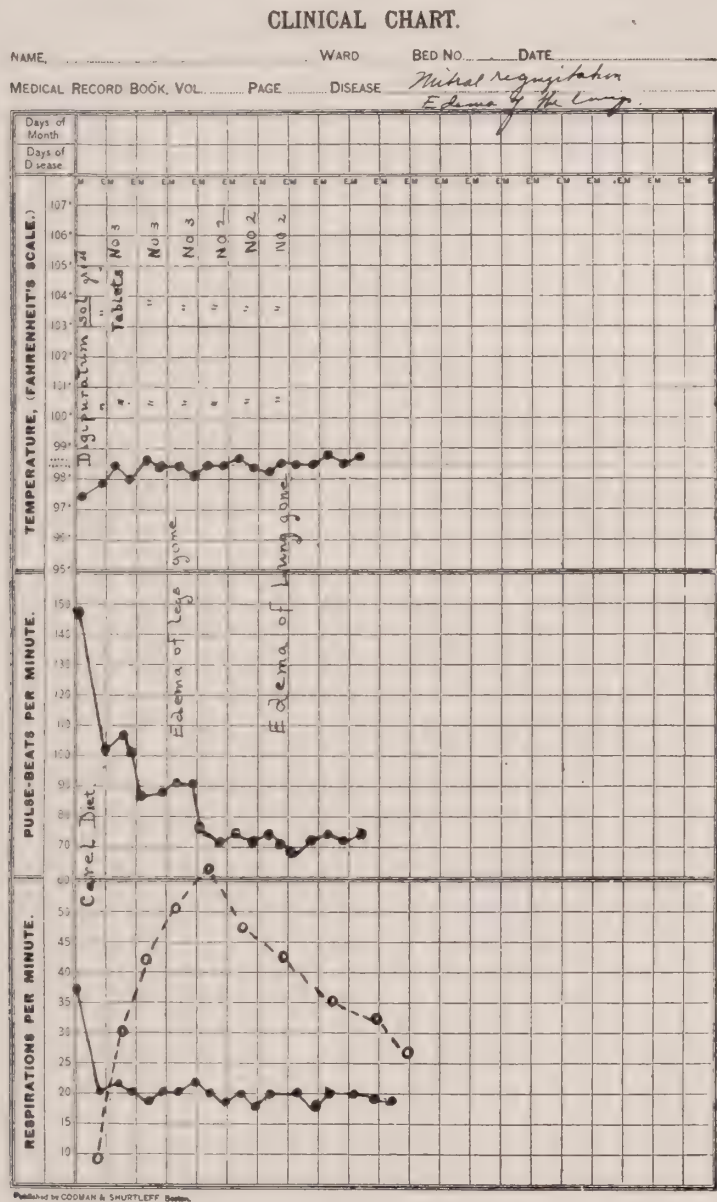
Second dose followed by same result, followed by alternating strong and weak heart-beat.

Third dose—no result until twenty-five minutes after administration. Patient suddenly became cyanotic, dyspneic, and died.

total number of cases injected to date is about twenty, and although the results in all these cases were very satisfactory, the number of cases treated in this manner is not sufficient to warrant final conclusions. The absence of local reaction in the cases treated, together with the well-established

reliability of digipuratum when it is given by mouth, promises well for the future of the drug.

Case 3.—When first seen at 4:30 a. m. this patient was in a condition of collapse, her respirations were very shallow and rapid, the pulse was 148 and hardly to be felt. For nearly a week the patient had been unable to sleep in bed; she had pronounced edema of the lungs, edema of the

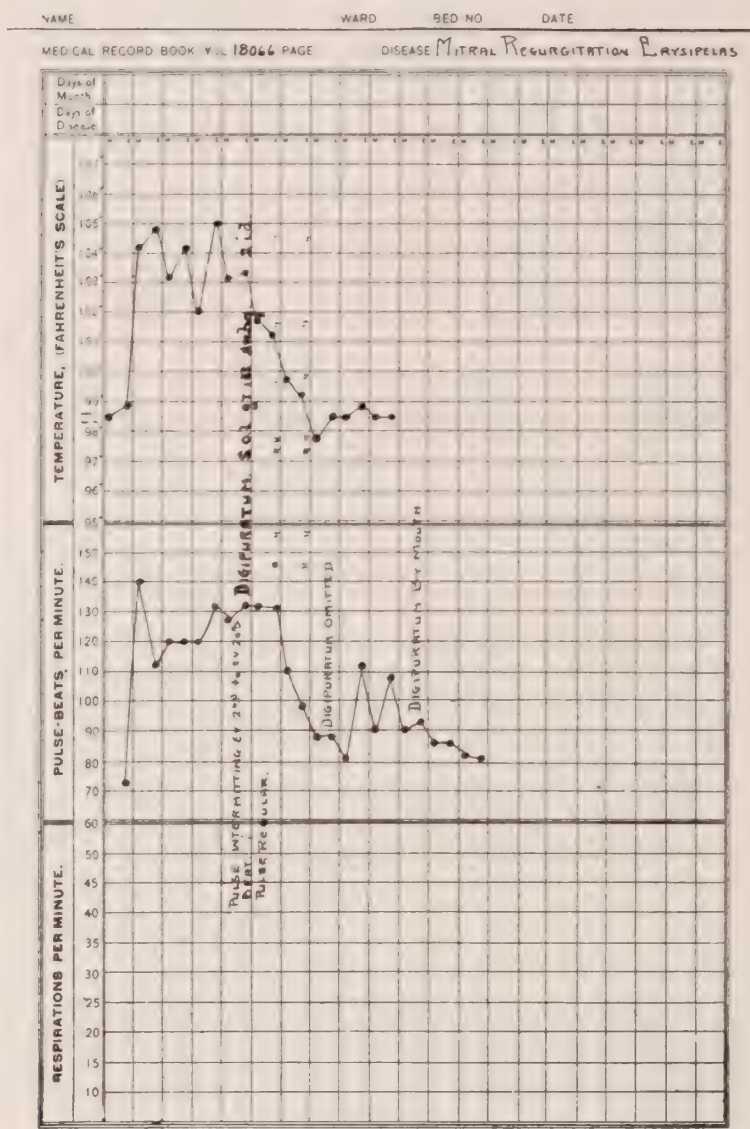


Case 3.—*Mitral regurgitation*. Severe break in compensation. Edema of ankles, anasarca, edema of lungs. Very rapid pulse hardly to be felt. Extreme dyspnea; not able to lie down for several days, sleeplessness. After first injection great improvement in course of one hour. Pulse and respiration dropped. After second injection patient spent a good night in bed. Carel treatment. Steady improvement under digipuratum by mouth.

ankles, slight general anasarca. For several days she had passed only a few ounces of urine a day. The apex was heard in the fifth space 1½ inches outside the nipple. The sounds were faint, there was a pronounced systolic murmur at the apex transmitted well into the axilla. On account of the puffiness of the skin it was difficult to find a vein in the arm without surgical preparation; it was therefore decided to give digipuratum solu-

tion intramuscularly. After the injection the patient seemed to become more feeble, and several syringes of camphorated oil were given during the first half hour. Towards the end of the hour the patient gradually improved, her respirations became slower and deeper and the pulse improved to a marked extent. In the course of another hour the pulse fell to 100. The patient was given another injection of $1\frac{1}{2}$ grains digi-

CLINICAL CHART



Case 4.—*Lying-In Case; Mitral Regurgitation; Erysipelas—Post-Partum.* Condition before first dose of digipuratum, rapid irregular heart, dropping 1 beat in each 4 and 1 in 20. Eight hours after first dose heart regular dropping only 1 beat in each 60 or 100. Steady improvement, intermittancy disappeared entirely in forty-eight hours, pulse fell to normal and digipuratum discontinued. Pulse rose again, but became normal in rate and character when drug was resumed.

puratum in the evening, after which she slept all night in bed. Carel diet was ordered from the start and digipuratum by mouth was begun the morning of the second day. The case improved progressively, the urinary output was very satisfactory, the edema of the legs disappeared rapidly, as did also the anasarca. The edema of the lungs diminished gradually and was gone on the eighth day.

The Carel diet, we think, is a very valuable therapeutic agent in the treatment of broken compensation. It consists simply in the strict limitation of food and drink to one quart of milk a day [5 glasses of good milk a day, beginning with 7 a. m. a glass (6 ounces) every 3 hours]. This diet is continued for five days and then solid food is gradually resumed while the total intake of liquids is kept at one quart. We have frequently seen mild breaks in compensation regain complete compensation with nothing but the Carel diet.

Case 4.—This patient was seen at the Boston Lying-in Hospital. It was a case of severe erysipelas of the breast occurring post-partum. The consultation occurred on the fifth day of the disease. The patient was in a serious state of collapse, and Dr. Belknap, the attending physician, had but little hope of her recovery. She was immediately given $1\frac{1}{2}$ grains digipuratum in solution, subcutaneously. The temperature began to fall within an hour after the injection and the patient's subjective condition improved markedly, while the pulse continued rapid for twenty-four hours, becoming, however, much more regular and improving in quality. At the end of the second day the pulse and temperature were almost down to normal, and the patient felt practically well. The respiration showed nothing remarkable, it was therefore not recorded. On the ninth day, after digipuratum had been omitted for two days, the pulse went up again. Under digipuratum by mouth, for several days, the temperature subsided completely, and the patient was discharged well.

To prevent the possibility of heart-block, care must be taken to obtain complete information concerning previous digitalis medication before giving strophanthin or digipuratum intravenously, or digipuratum subcutaneously. If digitalis has been taken the same day it will be wise to wait twenty-four hours before giving strophanthin intravenously, except in such cases where it must be given as a last resort. The subcutaneous application of digipuratum will be found, we think, a very safe method to produce rapid compensation; unless the pulse is suspiciously slow or dichrotic there will hardly be any danger in trying one subcutaneous injection of digipuratum solution, even if digitalis has been taken in moderate quantity the same day.

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ARTERIOSCLEROTIC CHANGES IN THE ABDOMINAL VESSELS.

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Through the descriptions of Ortner,¹ Muller,² Neusser,³ and Schnitzler,⁴ among others abroad, and Gilbride,⁵ and Akin,⁶ in this country, the clinical picture resulting from arteriosclerosis of the abdominal vessels has become fairly well defined. The picture has become sufficiently clear to justify its addition to the other members of the arteriosclerotic group, viz: the cardiac, the cerebral, the renal and the peripheral (intermittent claudication.) This paper is presented for the purpose of correlating the more important features of this type of arteriosclerosis and of adding a few new facts to its pathology and therapy.

Abdominal or splanchnic arteriosclerosis is equivalent to the other types of arteriosclerosis in its etiology and pathogenesis. The broadening concept that arteriosclerosis in general occurs as a result of abnormally increased functional demands (Kaufmann,⁷ Thoma, Albrecht, Marchand, Jores, the *Abnutzungskrankheit* of Romberg) applies with equal force to this form. Overeating, with chronic overloading of the stomach and intestines, is probably of special importance in the production of splanchnic vessel-change, in view of the direct strain on digestive function. Frankel and Hasenfeld,⁸ discuss the relationship of sedentary habits in corpulent individuals to the development of splanchnic sclerosis.

The clinical picture is many sided—at times resembling the gastrointestinal neuroses, at others simulating organic disease. The first evidence of the sclerotic process is seen most commonly in men over forty years of age, although vessel-changes frequently begin with puberty or earlier. Hirschfeld's,⁹ patient vomited blood from rupture of a sclerosed arteriole in the stomach at the age of eighteen. Gallard's,¹⁰ case was a young man of twenty-eight years: In an autopsy performed at the Augusta Hospital, Berlin, on a man thirty-two years of age, the abdominal aorta and the vessels of the lesser curvature of the stomach were markedly sclerosed.¹¹

The patients usually present marked weakness, loss in weight, and distaste for meat, suggesting carcinoma (Akin.) Inquiry reveals that this loss is due to lack of sufficient nourishment from fear of eating. Attacks of intense abdominal pain are often precipitated by food, particularly of the cabbage, pea, bean, etc., variety (Ortner,)²¹ and the patient cuts down his rations with the hope of preventing future attacks.

Abdominal distension, belching and flatus are common complaints, often occurring paroxysmally, and at night. Examination may show localized abdominal meteorism with prominent intestinal loops, but without spasm or peristaltic waves. Elliott¹³ describes a similar paroxysmal flatulency occurring at night in arterial hypertension. The phenomena are probably identical and in both cases due to periodically increased blood pressure from vessel spasm (Pal).¹⁴

Probably the most characteristic of the clinical phenomena are the attacks of severe abdominal pain—the angina abdominis,—attacks closely resembling angina pectoris, except for their localization.* The patient localizes the pain in the epigastrium and about the umbilicus. It occurs usually from two to three hours after a heavy meal, is gripping and twisting in character, lasts usually from one or two minutes (Kuttner)¹⁵ to

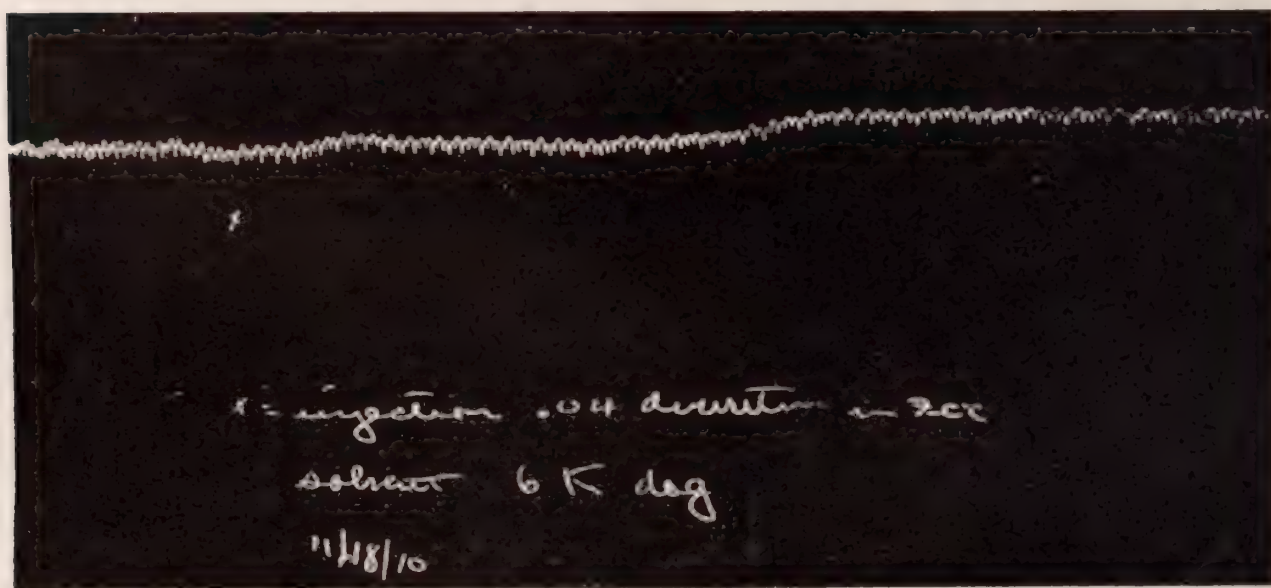


Figure 1.

The injection of 0.04 gm. diuretin in a 6 kg. dog causes a slight (10 mm.) rise of carotid blood-pressure recorded by a mercury manometer.

as many hours (Ortner), and is associated with distended abdomen, in contrast to the scaphoid abdomen in tabetic and lead crises (Pal), with dyspnea (and at times cyanosis), with obstipation, with anxiety and the fear of death. The agony of a patient during such a paroxysm may be intense. A woman in Neusser's wards, passing through such an attack, reminded one of the agony of the gastric crises, of intestinal obstruction, of kidney or gall-stone colic—with perhaps even increased intensity.

The cause of the angina has long been a source of dispute. Schnitzler and Markwald,¹⁶ draw the parallel to intermittent claudication and think the pain is due to ischemia following vessel spasm. Kaufmann and Pauli,¹⁷ and Ortner conclude that the pain is due to spasm of the vessel

*In this connection one remembers that the pain in true angina pectoris is often localized in the upper abdomen or even lower down. Cf. in particular. Neusser (Angina Pectoris).

itself from irritative changes in the intima. Buch¹⁸ obscures the question still further by the interesting observation of cases with extreme splanchnic vessel disease, but without symptoms. He suggests that there may be advanced endarteritic changes without involvement of adventitia, as Sternberg has described, in the extremities. This agrees with the views of Carriere,¹⁹ and Teissier,²⁰ that the tenderness is due to associated peri-arteritis.

The obstipation has likewise been the subject of some discussion. Pal¹⁴ showed experimentally in dogs, that peristalsis stopped in those segments of bowel whose blood supply had been interrupted. He explains clinically the obstipation as atony of bowel from anemia produced by vessel-spasm. Schlesinger²¹ saw recurrent ileus in two patients, which, through autopsy was shown to have been caused by sclerosis of the mesenteric

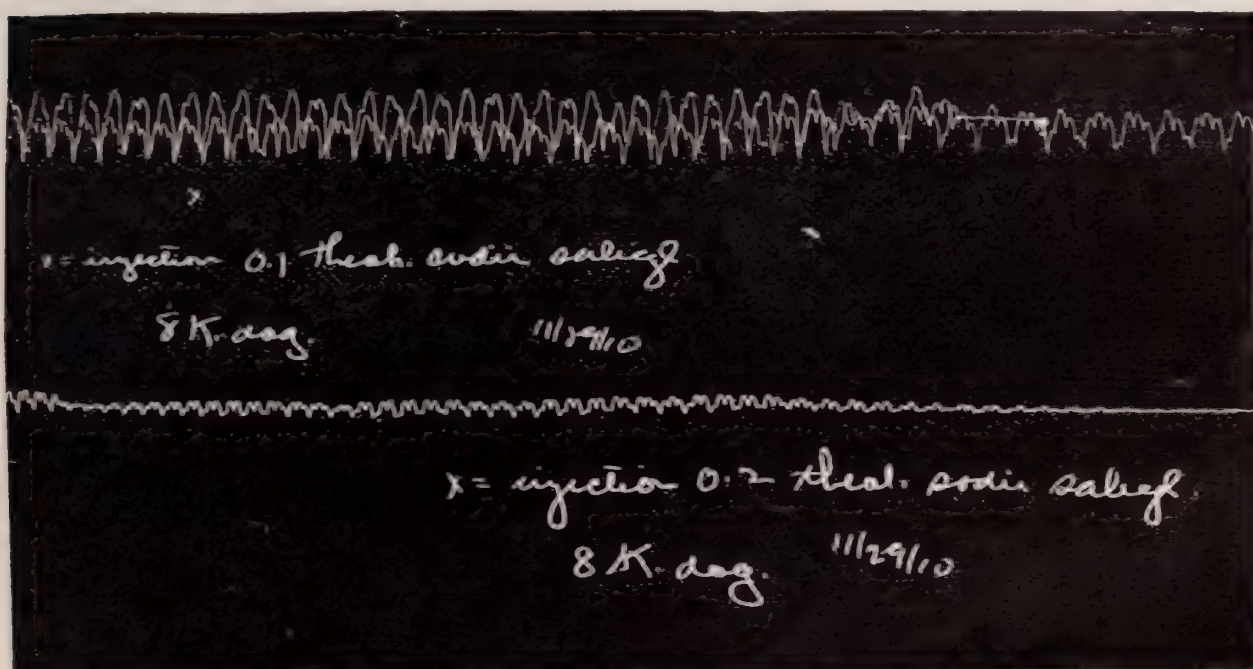


Figure 2.

The injection of 0.1 gm. theobromine sodium salicylate in an 8 kg. dog causes no change in the carotid blood-pressure (upper tracing). The injection of 0.2 gm. of the same drug 10 minutes later causes no change (lower tracing).

vessels. One case had undergone operation three times for obstruction without the cause being recognized.

Sudden profuse hematemesis simulating the hemorrhage of gastric ulcer, often with fatal outcome, is frequently the first and only evidence of abdominal vessel-disease. It occurs when the sclerosis has invaded the arterioles in the stomach and upper bowel submucosa. Gallard, in 1884, described the first fatal case of hematemesis on the basis of arteriosclerotic disease. His patient was a twenty-eight-year-old man who suffered with intense epigastralgia, and recurring bloody vomiting. Autopsy showed a small erosion on the posterior wall of the stomach, the floor of which contained a grey thrombus in a small aneurysmatically dilated

vessel. Case nine, of the series to be reported, was a forty-three-year-old woman, who four years previously had undergone gastro-enterostomy for ulcer. Autopsy showed a small sclerotic ruptured vessel protruding through the healed ulcer floor.

There are a number of helpful physical findings which may serve as differential aids. Arterial tension is usually increased, the degree depending on the extent of vessel involvement. A patient now under observation at the Central Free Dispensary, Chicago, with advanced abdominal

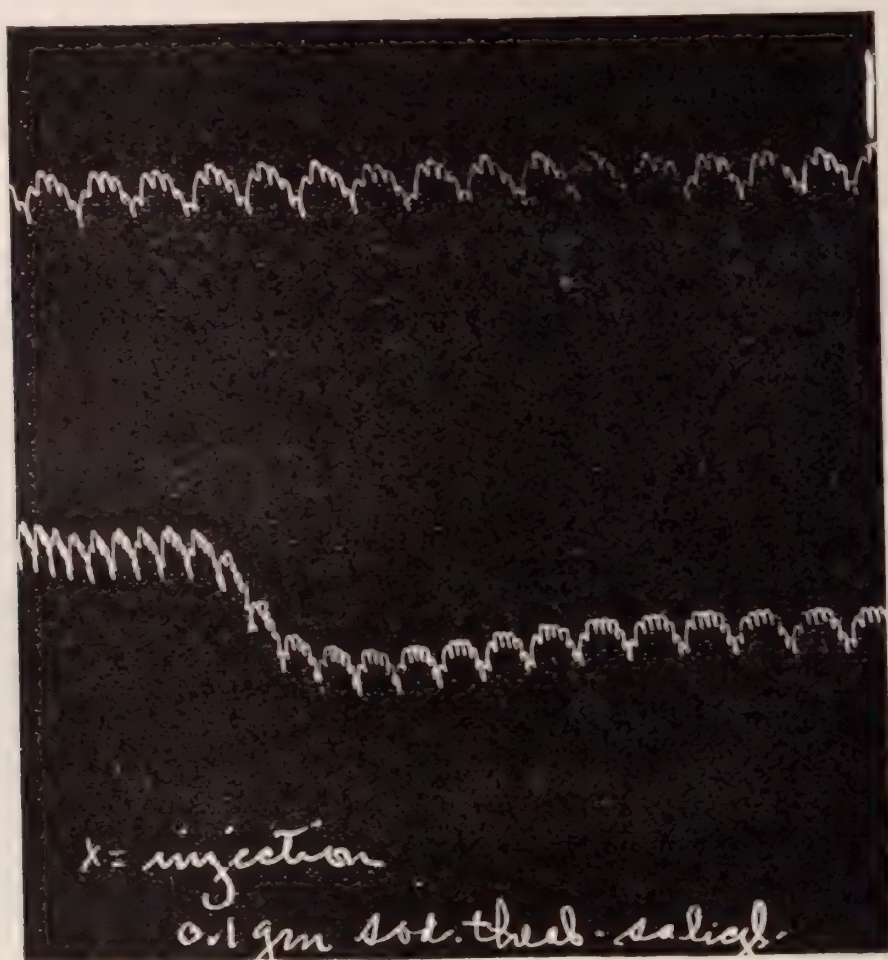


Figure 3.

The injection of 0.1 gm. sodium theobromine salicylate in a 4 kg. dog causes a slight fall in blood-pressure. (Lower tracing.)

arteriosclerosis, had a systolic blood-pressure of 196 mm. Hg. Left ventricular hypertrophy and accentuated aortic closure are present when the condition has persisted some time, and are directly related to chronic hypertension. During the attacks of angina the pressure is still further raised, due to vessel-spasm similar to the hypertensive crises in lead and tabes (Pal).

The relation of partial or complete obstruction of the splanchnic vessels to increased blood pressure has been recently studied experimentally. Longcope and McClintock,²² concluded that the rise in pressure, following clamping on the celiac axis and superior mesenteric artery, in dogs was due to mechanical blocking of circulation.

Marked abdominal pulsation and tenderness on pressure over the easily-palpable resistant aorta, are suggestive findings. Often one may hear a rough systolic murmur with the stethoscope over the course of the aorta.

Marked sclerosis in other vessels may be of valuable contributory evidence. In this regard, the recently published work of Fischer and Schlager,²³ is particularly suggestive. Seventy-five per cent of the arteries diagnosed clinically by Romberg as sclerotic, failed to show microscopic change in intima or media. They concluded there must be "func-

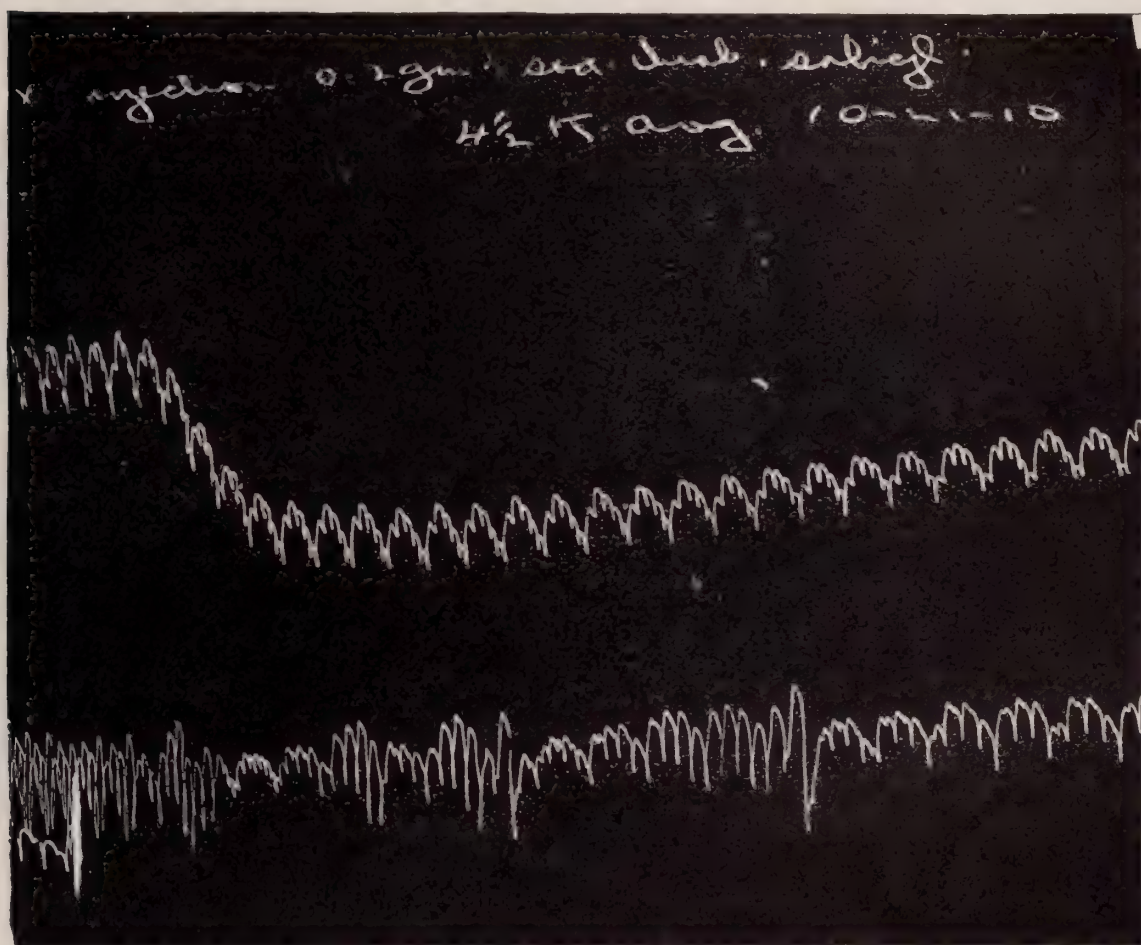


Figure 4.

The injection of 0.2 gm. sodium theobromine salicylate in a 4½ kg. dog causes a marked fall in the carotid blood-pressure recorded by a mercury manometer. (Upper tracing.)

tional thickening" in such vessels. The results show the need of conservatism in the diagnosis of sclerosis when thickening, resistance, and *tortuosity* are the only positive clinical findings.

The pathology of this report is based upon the results of the gross and microscopic study of 10 cases, carried out under the direction of Prof. Oestreich at the Augusta Hospital, Berlin. I shall give merely the conclusions reached from that study. The literature, technique employed, and findings in detail appeared in the *Deutsche Archiven fuer Klinische Medizin*, for August, 1909. Following the usual

autopsy, a careful macroscopic examination of the aorta and its larger branches was made.

Changes in the Stomach Vessels.—The 10 cases comprised five men and five women. In 6 cases under forty-three years of age, marked arteriosclerotic changes were found, the youngest being twenty-two years old. Two cases between 50 and 60 years of age showed no evidence of sclerosis. The changes in the stomach vessels were of the usual histological type found in sclerosis of other parts of the arterial tree, I found no aneurysmatically dilated arterioles described by other authors. In 3 cases a number of branches of the smaller vessels showed sclerosis, the remaining branches being entirely free. In some cases the vessels of the lesser curvature were more diseased; in others those of the pyloric

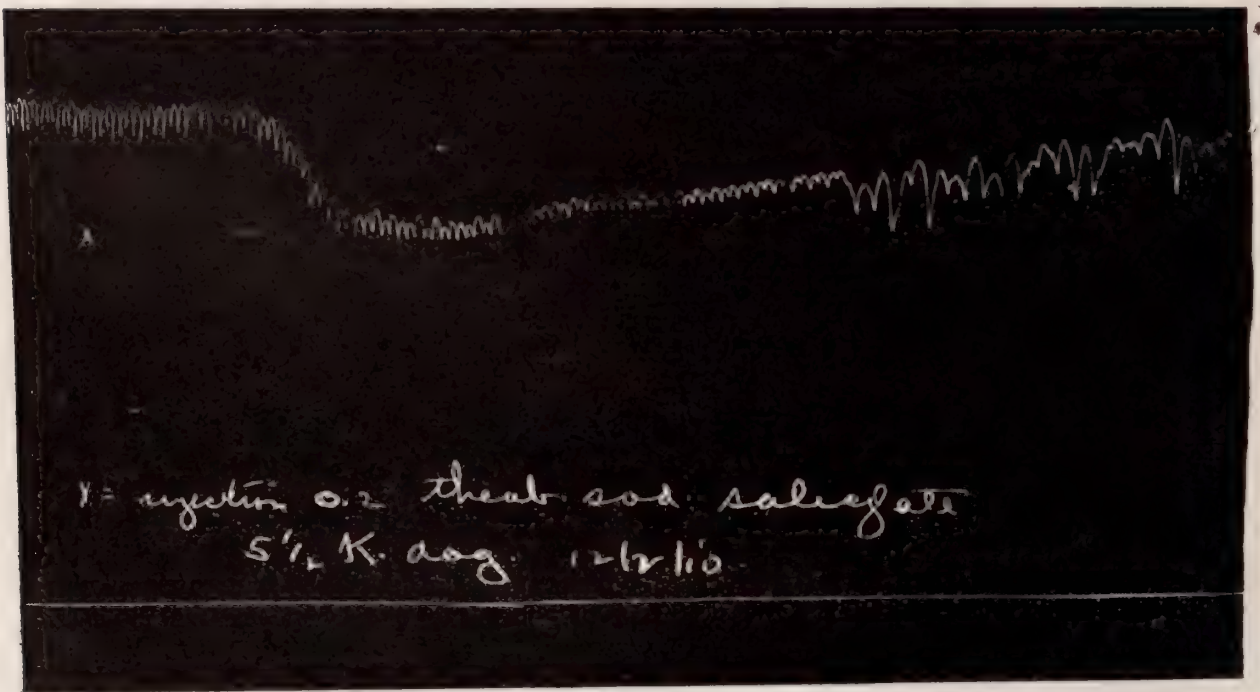


Figure 5.

Injection of 0.2 theobromine sodium salicylate with intact vagi. Compare with Figure 6.

or cardiac regions. No regular distribution could be determined, the vessels of the lesser curvature, the Art. Cor. vent. sup. dex. et sin. showing most frequent and extensive disease. The larger branches were more frequently involved than the smaller arterioles of the submucosa.

Changes in other vessels in relation to changes in stomach-vessels.—The conclusions may be summed up as follows:—

Marked irregularity in distribution of the arteriosclerotic process in different vessels. In spite of moderate sclerosis equally distributed throughout entire aorta, marked arteriosclerotic disease in coronary vessels in contrast to minimal change in celiac axis, and vice versa. One is not justified from the examination of any single vessel in estimating general arteriosclerosis. There may be no anatomico-pathological relationship between angina pectoris and angina abdominis in cases where

such a relationship seems to exist clinically. In this connection it is interesting to note a statement of Pal's, who describes hypertensive crises in perfectly normal vessels.

Changes in stomach vessels and their relation to pathological changes in stomach wall.—Minimal to moderate vessel sclerosis cause probably no determinable changes in stomach coats. This is likewise true in other organs—brain, heart, kidney. *Marked* sclerosis, on the other hand, has important sequelæ in spite of the rich arterial anastomosis; in one case ulcer, in another adenoma. Lewin,²⁴ describes a similar benign adenoma in one of his cases. Arteriosclerotic disease in the stomach vessels occurred in the early years of life in this series, and suggests the relationship to gastric ulcer, which likewise appears comparatively early. The fact that the larger vessels were more diseased than the smaller, is another factor in favor of ulcer formation. In other organs anemic and

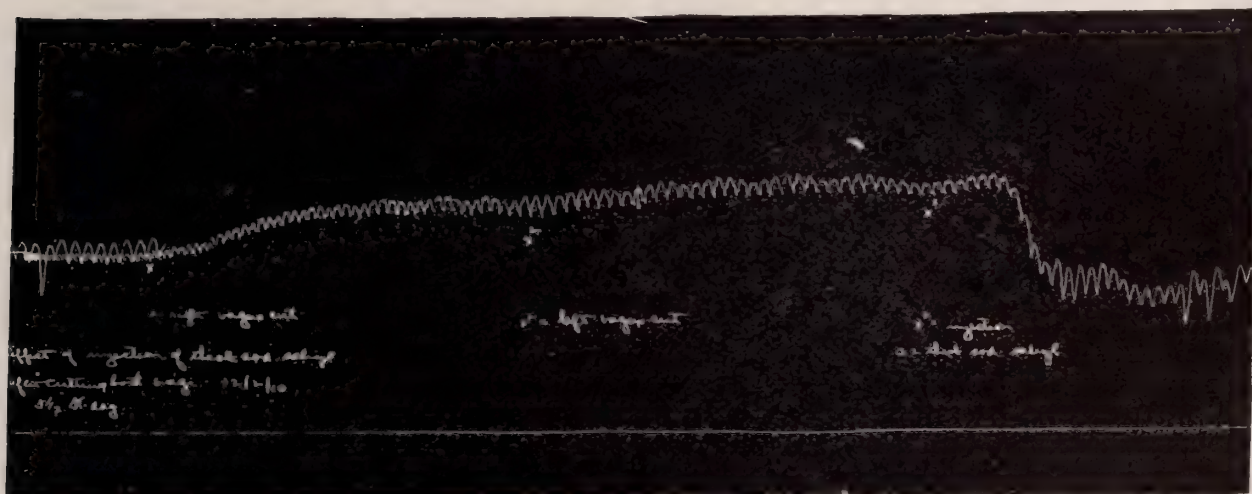


Figure 6.

Injection of 0.2 theobromine sodium salicylate after sectioning both vagi. Compare the marked fall in pressure with that obtained with intact vagi. (Figure 5.)

hemorrhagic infarcts follow closure of the larger vessels. A similar infarct or necrosis in the stomach would probably develop ulcer through digestion by stomach ferments.

Prophylactic measures for preventing the development of general arteriosclerosis are of course most essential. Until we understand more fully the metabolic processes concerned in arteriosclerotic disease, we must be content to give these in general terms. Reduction in excessive mental and physical work, in excessive food quantities, in tobacco, coffee, alcohol and other stimulants; avoidance as far as possible of fatigue, worry, anxiety and emotional excitement, moderation in exercise, sufficient sleep, sufficient warmth to the surface of the body with the prevention of chilling, regularity in bowel passage, out-of-door life in a warm equable southern climate of low altitude; these are among the controllable factors for the preservation of healthy arterial tissue.

When the vessels are definitely diseased similar measures are indicated. In addition, the iodides are usually given with supposed benefit. They probably do exert some direct influence on vessel-wall (Osler.)

I wish to speak particularly of the measures to be employed during the acute exacerbations of abdominal pain. Here active drug treatment must be instituted, together with complete rest in bed with warm applications to the abdomen. Osler,²⁵ recommends repeated large doses of nitroglycerine to lower blood pressure. Kreuzfuchs,²⁶ advises morphine. Kuttner, Pal, Neusser, Romberg,²⁸ Perutz,²⁹ Breuer,²⁷ Kaufman and Pauli, and Buch emphasize the value of the theobromine preparations, in particular diuretin (theobromine sodium salicylate).

The exact pharmacology of this action of diuretin is not clear. Plavec³⁰ (1904) from clinical observations on the diuretic action of theobromine concluded that it is a cardiac stimulant and a vaso-dilator, the resulting effect on blood pressure varying with the predominating action. Cohnstein, Thomas, Bock, Impens and Belan noted a fall of blood pressure following theobromine; Pfeffer, Geisler, Pawinski, Bordet, Tanszk and Solacoin noted a pressor effect.

Pal (1905) thought its activity as a vaso-dilator had not been demonstrated and quotes Neusser, that it may relieve the angina without influencing general arterial pressure. He suggests its point of action may be the sympathetic. Buch thought it neutralized the toxic effect of some hypothetical poison, which caused vascular contraction by irritation of the vasomotor center.

There seems to be no question that theobromine causes vascular dilatation as does caffeine.* In an endeavor to study its effects on blood-pressure, I have made some experimental injections in dogs. The work was done in the laboratory of the Michael Reese Hospital.

Diuretin (Knoll) and theobromine sodium salicylate (Merck) were used. They were dissolved in distilled water so that not more than 2 c. c. of total quantity of liquid was injected at any one time. The injections were made into the femoral vein of an anesthetized dog, the blood-pressure estimated from a cannula in the carotid artery connected with a mercury manometer and revolving smoked drum.

The results may be summarized as follows: Minute amounts of the drug (0.04 gm. in a 6 kg. dog) produce a very slight pressor effect (Fig. 1.) Somewhat larger dosage (0.1 and 0.2 gm. in an 8 kg. dog) produces apparently little if any effect (Fig. 2.) A very slight increase over an amount which produces no effect on blood-pressure, is sufficient to produce a distinct depressor effect. Fig. 3 (0.1 gm. theobromine sodium salicylate in a 4½ kg. dog.) Fig. 4 (0.2 gm. in a 4½ kg. dog.) Larger amounts produced a correspondingly greater depression. The average fall of pressure produced by increasing amounts has been tabulated in the following table:—

*Personal communication from Dr. G. N. Stewart, of Cleveland.

Grms. Sodium Theobromine Salicylate per kw. of animal.	Effect on blood-pressure expressed in mm. of Hg.	
	Rise.	Fall.
.0066	10mm.	0
.0125	0	0
.022	0	22mm.
.040	0	30mm.
.062	0	36mm.
.066	0	42mm.
.125	0	65mm.

The effect on the heart was not constant. Small amounts caused a moderate slowing while the large doses causing marked depression of blood pressure were usually accompanied by an acceleration of heart beat, probably an attempt to overcome the fall of pressure. That the depressor effect is due to a peripheral action was demonstrated by comparing the effect of injection before and after section of both vagi. Fig. 5 shows a fall of 24 mm. as a result of the injection of 0.2 gm.

Fig. 6 shows a fall of 62 mm. following the injection of an equal amount, both vagi having been sectioned just before injection.

While these results are not conclusive, they suggest strongly that the relief given by theobromine in abdominal angina is due to splanchnic dilatation, the area of greatest peripheral vaso-dilatation. The effect on blood pressure seems to be of secondary importance, depending on the relative balance between cardiac activity and peripheral vasomotor tone.

SUMMARY.

1. The clinical picture of abdominal arteriosclerosis is characterized by abdominal tenderness and distension, (without peristalsis), by severe paroxysmal abdominal pain, obstipation, hypertension and at times sudden profuse hematemesis.

2. The pathology of abdominal arteriosclerosis is similar to that of the peripheral vessel sclerosis; the larger branches of the vessels of the lesser curvature of the stomach are most frequently involved; advanced sclerosis of the gastric vessels seems to have a rather direct relationship to the production of gastric ulcer.

3. Intravenous injections of moderate amounts of theobromine sodium salicylate (diuretin) in dogs cause a fall in the carotid blood-pressure, apparently from splanchnic vaso-dilatation. This may explain the relief obtained clinically in angina abdominis following administration of the drug.

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MEDICAL AND SURGICAL PROGRESS.

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The more or less unconscious estimation of the blood-pressure by means of palpation of the radial artery is probably almost as old as the art of medicine itself. Our predecessors, with their highly trained sense of touch, must often have drawn just conclusions as regards the degree of tension of the arteries they palpated, although they were unable to formulate their observations as precisely as we now can. Indeed, some eminent clinicians even to-day maintain that they can estimate the blood-pressure at least as accurately by means of the palpation of some of the larger arteries as by the use of apparatus. Nevertheless, the fact remains that our knowledge of the behavior and significance of blood-pressure in health and disease has been drawn from the use of modern clinical instruments of precision.

In discussing this subject, the difference between the so-called systolic and diastolic pressures must always be kept in mind. With each beat

of the heart, a certain amount of blood is thrown out into the arteries. These, however, being highly elastic dilate to receive this blood and empty themselves only gradually through the capillaries into the veins. Thus the next beat of the heart finds the arteries still full of blood and this blood still under a considerable pressure, owing to the elastic tendency of the arteries to contract. The additional blood thrown into the arteries causes a renewed rise in pressure of their contents, so that the blood in them is alternately placed under a higher and a somewhat lower pressure, the latter, however, never even approaching zero. The former has been called the systolic or maximum pressure, the latter the diastolic or minimum pressure.

TECHNIQUE.

A great variety of instruments has been devised for the purpose of registering the blood-pressure, all of which are fundamentally based

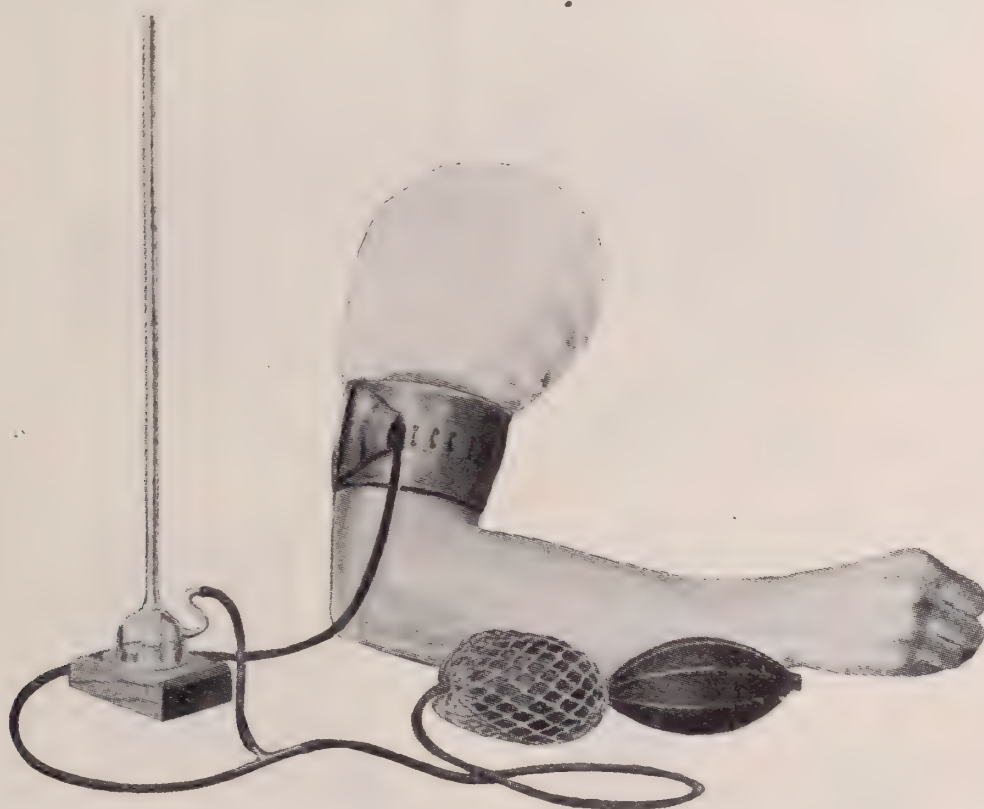


Fig. 1.—Cooke's modification of the Riva Rocci Sphygmomanometer.

upon two original types. The first, that of v. Basch, modified later by Potain, consists of a rubber bulb, whose lumen is connected with a mercury manometer. The bulb is placed over an artery and sufficient pressure exerted to cause the disappearance of the pulse, this pressure being registered in the manometer. The disadvantages of the apparatus are many, the fatal one being that any lateral pressure against the tissues, a matter hardly to be avoided, is registered as well as the pressure directly exerted upon the artery. The other method, upon which most modern instruments are based, dates from the communication of Riva Rocci in 1896. In this a rubber bag is made to encircle the arm and is inflated by a rubber bulb, the pressure in the arm-band being registered in a manometer. The amount of pressure required just to cause a disappearance of the radial pulse registers the maximum or systolic blood-pressure. The artery is equally compressed from all sides against the humerus, thus doing away with the chief fault of the earlier methods. Riva

Rocci, as more recent work has shown, used too narrow an arm-band. This, when inflated, produced a furrow in the arm, so that some of the pressure registered in the manometer was exerted upwards and downwards against the tissues and not upon the artery. Hence, all of the modern sphygmomanometers use an arm-band 10-12 cm. wide, in which this source of error is reduced to a minimum. They differ chiefly in the construction of the manometer. A brief description of some of those most commonly used may prove of interest to our readers.

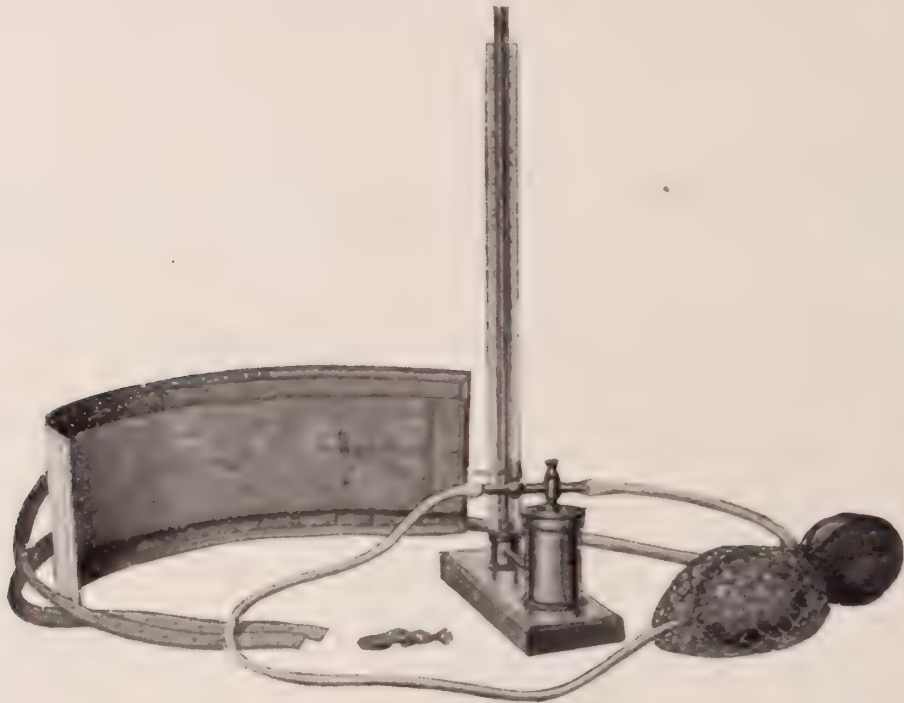


Fig. 2.—Stanton's Sphygmomanometer.



Fig. 3.—Janeway's Sphygmomanometer.

Riva Rocci Sphygmomanometer (Fig. 1).—The instrument that most nearly approaches the original apparatus of Riva Rocci is Cooke's modification. A long jointed glass tube, graduated in millimeters arises from a cistern of mercury, which is connected on the one hand with a cloth covered rubber arm-band and on the other with a double caustic bulb inflator. The instrument is fragile and not readily portable.

Stanton's Sphygmomanometer (Fig. 2) avoids these faults by the use of a metal cistern and more rigid joints. The rubber arm-band is surrounded by a canvas cuff. The instrument is easily portable, but a little troublesome to set up and the mercury is readily spilt by the inexperienced user.

Janevay's Sphygmomanometer (Fig. 3) employs the U-tube mercury manometer, with the longer arm jointed, and a Politzer bulb as inflator. It is readily portable and very convenient to use but is rather fragile and in it, too, the mercury is easily spilt.

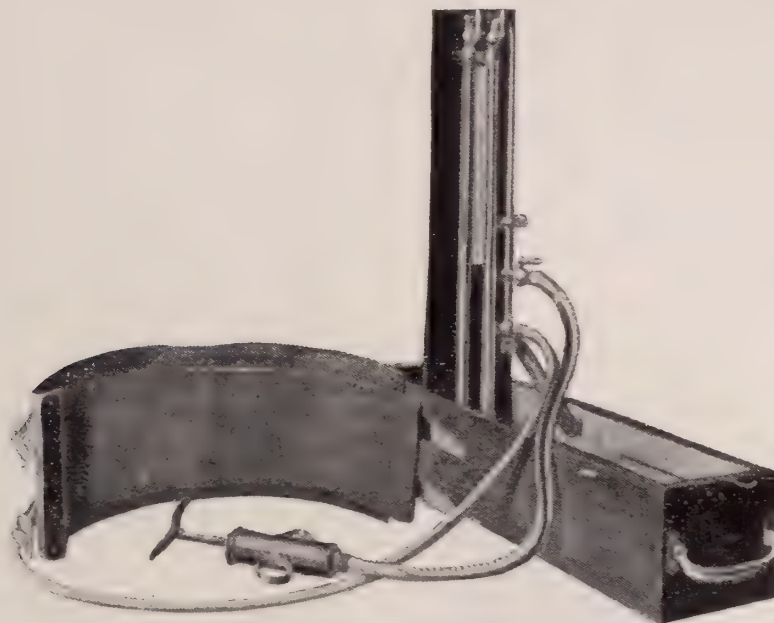


Fig. 4.—Faught's Sphygmomanometer.

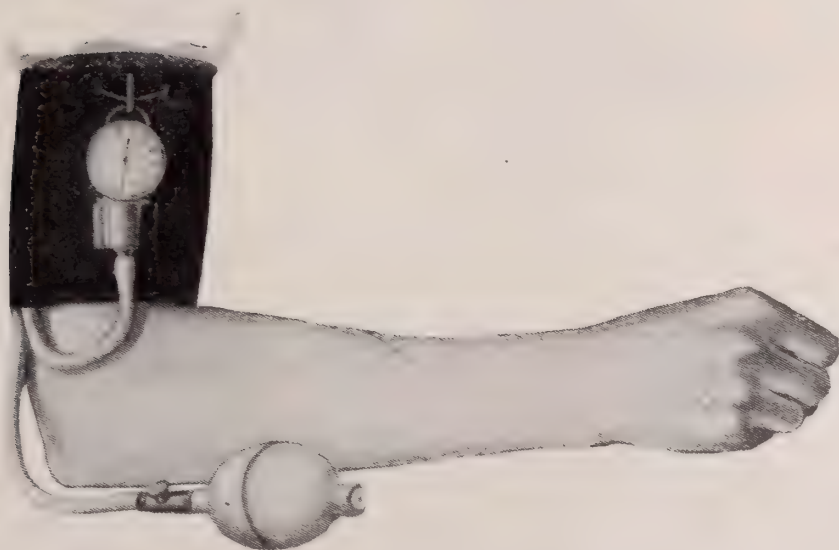


Fig. 5.—Roger's (Tycos) Sphygmomanometer.

Faught's Sphygmomanometer (Fig. 4) is perhaps the most convenient of those using the mercury manometer. Each arm of the U-tube, which is not jointed, but is mounted solidly against the lid of a box, is provided with a stop-cock which is closed before the instrument is put away and thus avoids all danger of spilling the mercury. The most recent models have a metallic pump which is in every way superior to the rubber bulb inflators. The instrument packs into a box some fourteen inches long in which it can readily be carried about.

Roger's Sphygmomanometer (Fig. 5) is more conveniently portable

than any of the above. The mercury manometer is replaced by a metallic spring with a dial, the arm-band is held in place by a cloth cuff which is simply wrapped about the arm and the inflator is of the atomizer-bulb variety. The whole can readily be carried in the coat pocket. The dial manometer is however neither so delicate nor so permanent as those employing mercury.

Erlanger's Sphygmomanometer (Fig. 6) has the great advantage of affording graphic records. By means of an ingenious device, the impulse of the brachial artery against the inflated rubber arm-band is recorded on the smoked surface of a kymographion drum. When the arm-band is inflated so as entirely to occlude the artery, no pulsation is registered. As the pressure is allowed to fall, the appearance of distinct pulsations marks the systolic pressure. The pulsations grow larger as the pressure falls until the point of diastole pressure is reached; whereupon they rapidly decline in amplitude. The disadvantages of the apparatus, besides its bulk, lie in the fact that the mercury column and the pulse tracing must be watched simultaneously, not always an easy matter, and that the

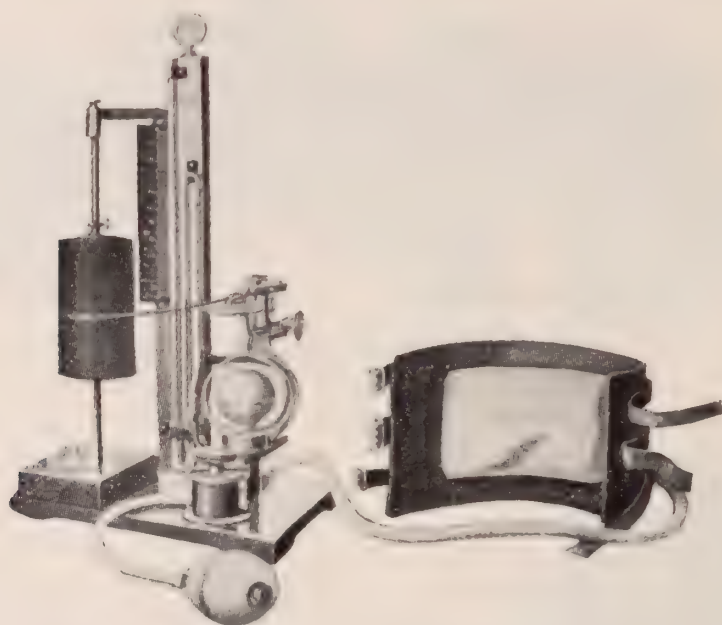


Fig. 6.—Ehrlanger's Sphygmomanometer.

point of systolic pressure is not always distinctly marked. For the purpose of recording the diastolic pressure, however, the apparatus is the best at our disposal.

Von Recklinghausen's Tonometer (Fig. 7) is extensively used for accurate blood-pressure measurements, especially in Germany. It consists of an extremely delicate spring manometer, a wide cuff not unlike those described above and a long, metallic air-pump. While bulky, it is portable. Its chief disadvantage is its relatively high price.

Hill's Sphygmometer (Fig. 8) has the usual arm-band and inflating bulb and an ingenious portable mercury manometer. It consists of a single tube, the lower end of which is sealed into a small reservoir, as is shown in the enlarged figure of this part of the instrument. The armlet tube is attached to the end of the glass tube, which is also sealed into the reservoir, and opens into the upper part by a capillary opening. A small quantity of mercury is introduced into the reservoir. When the pressure is increased, air is forced into the reservoir and the mercury is driven up the manometer, registering the pressure on a millimeter scale.

When in use, the manometer is fastened to the wooden thermometer case, in which it is carried, by a rubber ring; a simple little brass foot is screwed on the end of the case and supports it in the vertical position. The brass foot folds up and goes into the case beside the thermometer. Owing to the capillary openings the mercury does not spill. The wooden case containing the manometer may be thrown into a satchel with the arm-band and bulb, and thus carried conveniently.

Among the instruments less frequently used a few deserve still to be mentioned.

Sahl's Sphygmobolometer is a complex apparatus by means of which not only the blood-pressure but the energy of the pulse may be measured. The complexity of the apparatus and the skill required for its manipulation render it as yet suitable only for purposes of research.

The Sphygmo-oscillometer was devised by Panchon, a Parisian physiologist. It consists of a pump, an arm-band and a manometer con-

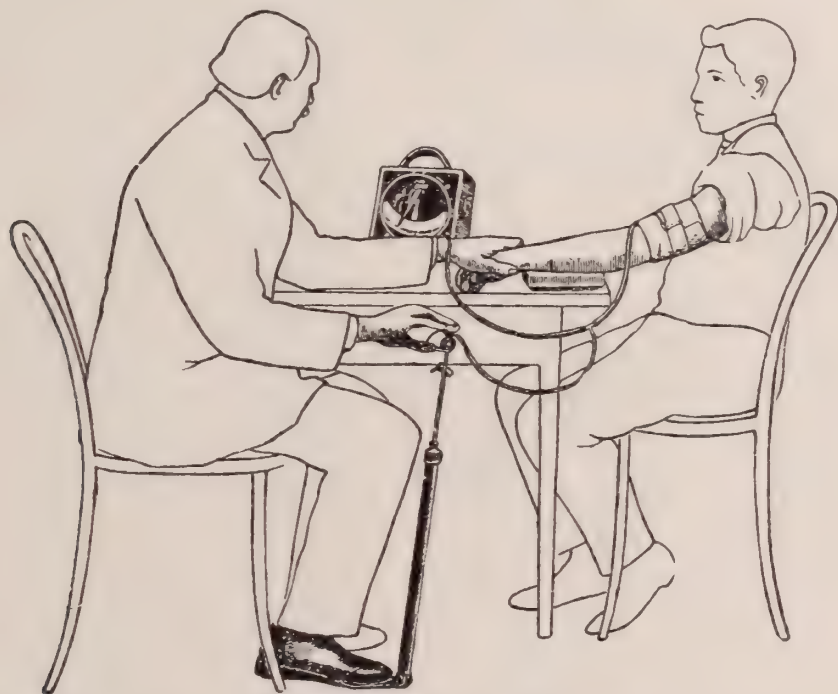


Fig. 7.—Von Recklinghausen's Sphygmomanometer.

sisting of a rigid metal box containing a delicate aneroid barometer. The amplitude of the oscillations of the latter renders the estimation of the diastolic pressure particularly accurate.

Gaertner's Tonometer, though very portable and compact, has practically been abandoned by clinicians. A small hollow rubber ring, connected with a pump on the one hand and with a manometer on the other, is slipped over the finger which is then made anemic by means of a rubber band. The latter is removed and the pressure that will just permit the return of the blood to the finger-tip is recorded. The apparatus permits only of the determination of the systolic pressure and even so is subject to a variety of sources of error.

METHODS OF ESTIMATING BLOOD-PRESSURE.

Palpatory.—The older methods of estimating blood-pressure all depend upon the palpation of the radial artery, while pressure is exerted higher up, usually by means of an elastic bag upon the brachial. The arm-band

is first inflated until the radial pulse has entirely disappeared. Then with the eyes upon the manometer and a finger upon the radial, the observer allows the pressure to fall, until the radial pulse reappears. This point marks the maximal or systolic pressure. As the pressure in arm-band and manometer is allowed to fall still further, the radial pulse becomes stronger. A point of maximum pulsation is reached, after which, if the pressure continues to fall, the pulse again becomes smaller. This point of maximal radial pulsation marks the minimal or diastolic pressure. A little training of the sense of touch is required for the determination of the maximal blood-pressure, beginners usually obtaining results somewhat too low. A much higher degree of *tactus eruditus* is

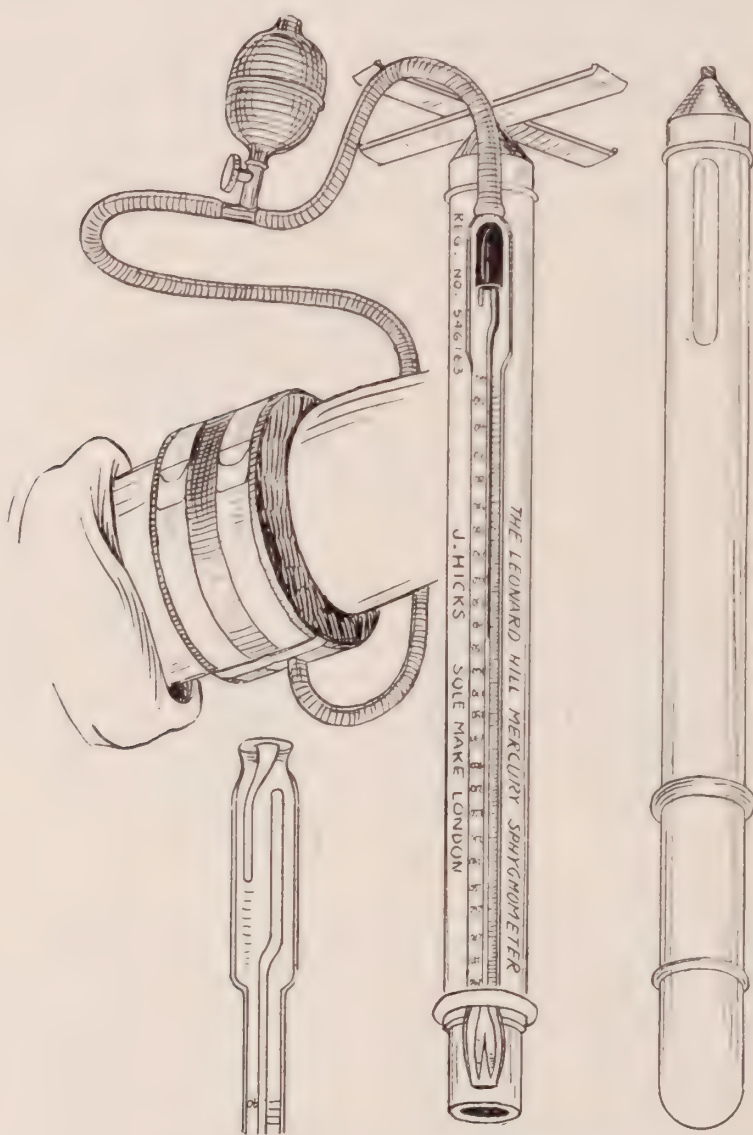


Fig. 8.—Hill's Sphygmometer.

necessary for the palpatory determination of the minimal or diastolic pressure. The difference between the strength of the radial pulse 10 mm. above and below the point of maximal intensity is by no means always great, and different observers, especially if relatively unskilled, will by no means always agree in their estimates. The method becomes somewhat more satisfactory if, as suggested by Hirschfelder, "the artery is palpated with the ball of the finger instead of the finger-tips, while the finger-tips rest against the radius." Repeated determinations are necessary.

The chief recent exponent of this method, though in a modified form,

is Ehret. He has found that, as the pressure in the arm-band is steadily raised, a point is reached at which the pulsation in the cubital artery, at the bend of the elbow, suddenly becomes stronger; so much so that the adjoining tissues are shaken with each pulse. This point marks the diastolic pressure, as Ehret was able to show by comparison with other methods of recognized validity. He considers it the simplest and most accurate method of determining the diastolic pressure. Our own experience with the method has not been so favorable. Cases are not infrequent in which the change in amplitude of the pulse at the point of diastolic pressure is by no means so striking as Ehret's description would lead one to suppose. For routine use we consider it distinctly inferior to the equally simple auscultatory method.

Oscillatory.—If, after raising the pressure in the arm-band high enough to occlude the brachial artery and then slowly allowing the pressure to fall, one watches the mercury manometer, one is usually able to see very faint oscillations of the top of the mercury column. These are due to the brachial pulse impinging from above upon the occluding air-bag. As the pressure in the bag falls a point is reached at which these tiny oscillations suddenly become more marked: this is due to the passage beneath the arm-band of the first pulsations and marks the point of maximum pressure. As the pressure in the arm-band continues to fall, the oscillations of the mercury become more marked and reach their maximum at the point of diastolic or minimal pressure. Thereupon they again decrease rapidly in amplitude. In the more delicate sphygmomanometers of Ehrlanger, v. Recklinghausen and Pachon, these differences are more marked and more readily recognized than in the simple instruments of Janeway, Stanton and Faught; in the instruments of Ehrlanger and Uskoff the fact that the pulsations are registered graphically reduces the personal factor to a minimum. There can be no doubt that, in these better instruments, this method represents the best means for accurately determining the minimal pressure. The point of maximal pressure cannot always be so accurately made out by this method.

Auscultatory.—For routine clinical work, the auscultatory method of Korotkow is at once the most convenient and the most accurate. If the arm-band is inflated to a point above the maximal pressure and the bell of a stethoscope is placed over the cubital artery in the bend of the elbow, nothing is heard. As the pressure is now slowly allowed to fall, a knocking sound, synchronous with the heart-beat, is heard over the artery as soon as the maximal pressure is reached. This sound is evidently due to the sudden distension of the walls of the empty artery by the first jets of blood that pass below the occluding arm-band. As the pressure falls, this knocking sound grows louder, is then often replaced by a murmur, which again gives place to a knocking sound similar to the first. This last sound then suddenly diminishes in intensity and, after a further fall of a centimeter or so, ceases entirely. Miss Allen and Mr. Engle, in the study of the blood-pressures of thirty-five patients in the Johns Hopkins Hospital, compared this method with the results obtained with the Ehrlanger instrument. They found that the minimal pressure corresponded very accurately with the entire disappearance of all sounds, a view which is shared by most of those who have studied this question. A number of observers, among them Fischer, Lang and Manswetowa and Hoover, hold that the point of diastolic pressure is to be found at the instant when the second knocking sound suddenly diminishes in intensity. Our own observations lead us to con-

sider this latter view the correct one, but the entire subject clearly requires further study.

We may say then that the palpatory method is useful chiefly for the determination of the maximal blood-pressure, and the oscillatory method for the determination of the minimal blood-pressure. The auscultatory method, on the other hand, is equally useful for both.

Goodman and Howell have made a careful study of the sounds heard over the cubital artery during the auscultatory determination of blood-pressure, and have arrived at some interesting conclusions. Following Ettinger they distinguished five phases: first, "a loud, clear-cut snapping tone (the first phase), which is followed by a second phase, consisting of a succession of murmurs; the third phase begins with the disappearance of the murmurs and the appearance of a tone resembling in a certain degree that of the first phase, but less well marked, which soon becomes less clear in quality (dull) the fourth phase, and is followed by the disappearance of all sounds, the fifth phase." They consider close observation of the succession of these sounds in a given patient valuable not only for the determination of systolic and diastolic blood-pressure, but also, in certain cases, for the diagnosis of the nature and extent of the cardiac lesion. Thus in aortic insufficiency there is no fifth phase, the persistence of the snapping tone being almost pathognomonic. In arteriosclerosis with cardiac hypertrophy, the second and third phases are prolonged (high pulse pressure); where there is no such prolongation, in this condition, the heart has become relatively incompetent. When failure of compensation sets in, the second phase is the first to suffer, not only by a decrease in the range through which the murmur is heard, but also by an impairment of its intensity. The third phase is the next to be affected by an encroachment of the fourth phase, which is correspondingly lengthened, an indication of severe incompetence. Organic and functional cardiac derangements may be distinguished by the occurrence of variations in the intensity of successive murmurs and tones, or even by an alternation in the order of their occurrence: features characteristic of functional rather than organic cardiac derangements. Tornai reported similar observations, somewhat over a year ago. He believes that this method affords us the best means of estimating the functional capacity of the heart.

It is generally assumed that, at the point of maximal or systolic blood-pressure, when the constricting arm-band just prevents the passage of the pulse, the artery is entirely occluded. Benczur, after determining the maximal pressure simultaneously, in the same arm, with a Riva Rocci arm-band and a Gaertner tonometer, concludes that this is by no means the case. The so-called maximal pressure, he maintains, suffices to prevent the passage of the pulse, just as do the capillaries, but leaves the artery still patent. A considerably higher pressure is required completely to occlude the artery. From a comparison of these two pressures, he derives conclusions, in cases of heart disease, as to the degree of cardiac compensation. Benczur's observations are interesting and important, if true, but require confirmation.

In this connection the interesting observations of Hoover deserve mention. While not decrying the value of instrumental determination of the blood-pressure, he calls attention to the fact that the older methods of direct palpation of the artery do not deserve the neglect into which they have fallen. While it is true, that palpation of the radial gives results that are untrustworthy, this is merely because the radial is too

small a vessel. If a large superficial artery, such as the femoral artery, be palpated a trustworthy impression of the lateral pressure in the abdominal artery is readily obtained. This simple little manipulation deserves a place in every routine physical examination. With a little practice, Hoover maintains, the clinician should be able so to estimate the arterial pressure within 10-20 mm.

BLOOD-PRESSURE IN HEALTH.

In general it may be said that the average blood-pressure increases with advancing years. The limits in normal individuals at rest are usually taken as systolic, 110 to 135 mm.; diastolic, 60 to 90 mm.; pulse pressure, 30 to 45 mm. At all ages, 160 mm., or over must be regarded as pathological; in younger people, somewhat lower pressures may be so considered.

Woley has measured the arterial pressure in 1,000 healthy persons varying in age from fifteen to sixty-five. Five physicians shared in this task and each record was checked by the use of two different instruments. The "average high" pressure was obtained by averaging the highest 15 per cent. of records; the "average low" pressure by a similar treatment of the lowest 15 per cent.

"With this explanation, the results reached after a study of 1,000 blood-pressures are as follows:—

The average blood-pressure for males at all ages was 127.5 mm.

The average blood-pressure, for females, at all ages, was 120 mm.

By taking them in groups, first, from ages 15 to 30, the average blood-pressure was 122 mm. An average high blood-pressure of 141 mm., and an average low of 103 mm.

Second, those from 30 to 40 years of age gave an average blood-pressure of 127 mm. An average high of 143 mm., and an average low of 107 mm.

Third, those from 40 to 50 years of age gave an average blood-pressure of 130 mm., an average high of 146 mm., and an average low of 113 mm.

Fourth, those from 50 to 60 years of age gave an average blood-pressure of 132 mm., an average high of 149 mm., an average low of 115 mm."

It will be seen that "there is a gradual rise in the blood-pressure as the years advance. There is also a corresponding rise in the high and low averages. It can be readily seen that between 50 and 60 years of age a man giving a blood-pressure of 145 mm. could undoubtedly be accepted without further question, while a man under 30 years of age giving the same blood-pressure would present a case for further study and investigation.

In regard to women, it will be noticed that the average blood-pressure at all ages was 120 mm., about 8 mm. below the average in males at all ages. There is practically the same ratio of increase in blood-pressure in women as in men at the same age. In women it averages 8 points below the men."

Seiler has investigated the normal pressures in children and comes to the following conclusions. At the age of two to three years the systolic pressure is 80 mm., from which it rises gradually till at sixteen to seventeen it reaches 110 to 120 mm. In children of the same age, the pressure varies also with height and body weight. Sex makes no difference.

One important source of error, inherent in all blood-pressure determinations, must never be forgotten. As has long been known, and as

Schrumpf and Zabel have recently shown in detail, various psychic influences may cause a temporary rise of blood-pressure, sometimes of a very considerable degree. Thus the pain caused by the constricting arm-band, fear of the unusual procedure or of an unfavorable verdict from the physician, impatience at the undue duration of the test or even a disagreeable thought that may be occupying the patient's mind, may cause a temporary increase in blood-pressure. This increase will be most marked in neurotic individuals and may equally affect those with and those without a permanent hypertension. A lowering of the blood-pressure does not seem to result from psychic influences. If then, we find the blood-pressure normal or low, the psychic element may be neglected. If it is high, care must be taken to exclude this source of error. Of a number of differing observations on the same patient, the lowest ones will most nearly represent the true value. This psychic disturbance can best be eliminated by establishing a proper understanding between patient and physician, and by completing the test with as little delay as possible.

HYPERTENSION.

While a number of practitioners, who are making frequent use of the sphygmomanometer for the purpose of detecting the presence of hypertension, is ever increasing, the prevalent notions regarding the real significance of this phenomenon are very vague. There is a widespread belief that hypertension is in itself a disease, towards the relief of which, medical and other therapeutic measures must be directed. This is as much an error as it would be to consider icterus or albuminuria diseases in themselves. Hypertension is merely one manifestation of some underlying pathological condition, the recognition of which is essential for proper diagnosis and rational therapeutics. Another erroneous notion is the confusion between arteriosclerosis and hypertension. Recent work along this line has shown that abnormally high blood-pressure occurs in barely half of the cases of outspoken arteriosclerosis of the peripheral vessels, and that even in these cases it may be due to some other cause. Where the artery to be tested is very much thickened, the resistance of the arterial coat itself to compression must be taken into consideration, in estimating the significance of an apparently increased blood-pressure. This source of error may be detected or even eliminated by taking the blood-pressure in the other arm or in either leg. Arteriosclerosis never affects all the arteries alike, so that in some of them the apparent blood-pressure will be nearer the real figure than in others. In such a series of determinations, the lowest pressures found will be nearest the true value. Moreover, it is astonishing how often we find pressures normal or subnormal in patients with greatly thickened or even calcareous arteries.

The conditions responsible for the occurrence of hypertension may, following Rudolf, be conveniently grouped into five divisions:—

1. Toxines that directly raise blood-pressure and at the same time have an injurious effect upon the arterial wall. Such are nicotine and the products of proteid decomposition in the intestine;
2. Toxines that directly raise blood-pressure without injuring the arterial wall;
3. Local disturbances of the circulation in the brain, kidneys or elsewhere, that lead to a compensatory rise in blood-pressure;

4. High-grade neurasthenia; and
5. Arteriosclerosis of the aorta and the splanchnic vessels.

As regards the first group, its significance for the therapeutics of the condition is evident and will be considered more in detail later. Where the action of these toxins is long continued, the persistent hypertension caused by them will eventually lead to general arterio-capillary sclerosis. The patient then presents the picture of hardened arteries with hypertension, and the temptation is great to consider the latter as due to the former, whereas the reverse is actually the case.

In connection with the second group, the toxemias of pregnancy especially require consideration, one of the earliest and most constant signs of these conditions being a rise in blood-pressure. For the last five years, Starling has made it a rule to take the blood-pressure as often as possible of every pregnant woman under his care, especially during the last two months of pregnancy. In spite of the conclusions arrived at by Vogeler and other writers, Starling is convinced that, during the whole period of normal pregnancy, the blood-pressure is normal—that is, from 110 to 120 mm. Hg. Any rise of blood-pressure above 125 mm. would make him suspect that the pregnancy was not quite normal and would put him on the lookout for some degree of toxemia.

Hirst has obtained similar results, the pressure in 100 normally pregnant women averaging 118 mm. Hg. during the first seven and a half months and rising to 124 mm. towards the end of pregnancy. In women showing evidence of toxemia, however, the picture changes. The blood-pressure, in thirty-nine women with eclampsia and eighteen who did not have eclampsia, but had marked albuminuria at the time the first examination was made, was at its lowest 142 mm. Hg. The highest blood-pressure recorded in a woman without eclampsia was 192 mm.; the highest in an eclamptic was over 320 mm., the mercury running out of the top of the tube before a sufficient pressure was obtained to shut off the pulse.

Green concludes from his studies of puerperal toxemia that "eclampsia is a toxic condition dependent primarily on the development of the fetus, manifesting itself by general and renal signs. This may be of varying grades, impending or mild, acute or severe, and fulminating or fatal. Each grade presents a definite clinical picture and is associated, the first with a moderate, the second with a marked, the third with an extreme increase of blood-pressure. In the first two the symptoms disappear and the blood-pressure falls after delivery. In the last the blood-pressure rises and the disease progresses to a rapidly fatal termination. The blood-pressure seems definitely related to the type of case, and its observation should be of value in prognosis and treatment."

The third group includes those cases of increased intracranial pressure, cerebral arteriosclerosis, beginning interstitial nephritis and the like in which an increased blood-pressure is indispensable for the adequate supply of blood to these vital organs. Here an attempt at medicinal reduction of the blood-pressure might have serious results if, fortunately, it did not almost always fail of the desired effect. The mechanism by which hypertension is maintained in these conditions is still obscure. The experiments of Alwens are of interest in this connection. He enclosed, one kidney of a cat in an oncometer which communicated, on the one hand, with a pump and, on the other, with a mercury manometer. As soon as pressure was exerted upon the enclosed kidney, the animal's blood-pressure rose promptly, to fall again when the pressure was re-

leased. This phenomenon occurred even when all of the kidney's nervous connections were severed, so that it must, at least in part, have been purely mechanical. The rise observed was, however, far less than that observed in human beings with interstitial nephritis, so that in this condition a variety of factors is probably responsible for the hypertension.

The hypertension of neurasthenics has already been discussed. It is very variable and dependent upon psychic influences. In any concrete case the true significance of an observed hypertension can never be determined unless this source of error has been eliminated.

Sclerosis of the aorta and of the splanchnic vessels may, it is true, lead to a compensatory hypertension on account of its interference with the function of the kidneys and of other vital organs. Ordinarily, however, arteriosclerosis is a result rather than a cause of hypertension. A striking illustration of this fact is to be found in the result of repeated injections of adrenalin into rabbits. The persistent hypertension that results from these injections is soon followed by generalized arteriosclerosis. Clifford Allbut classifies cases of arteriosclerosis from the etiological point of view as follows:—

1. Arteriosclerosis resulting from high blood-pressure;
2. Infectious and toxic cases; and
3. A senile group.

In the second and especially in the third group, hypertension is often absent or is at least a late complication. Where the arteries of the extremities are greatly thickened, a certain allowance must be made for this factor, in estimating the true blood-pressure (according to Herringham, 3-34 mm. Hg.), and in such cases a real hypertension cannot be assumed unless a hypertrophy of the left ventricle can be demonstrated.

Besides the persistent hypertension discussed above, a number of cases of paroxysmal increase in arterial pressure have been recently reported. Thus Barker describes a case of tabes dorsalis in a woman, in which the blood-pressure rose during a gastric crisis to 220 mm., the diastolic pressure being 190 mm. The crisis lasted seven days, the blood-pressure remaining high during the entire period, except when temporarily depressed by amyl nitrite. With the cessation of the crisis, the pressure dropped to 120 mm., and there remained. Petren has observed 2 cases of aneurysm of the aorta, in which cardiac asthma seemed to be preceded by an abrupt rise in blood-pressure, this being followed by an acute edema of the lungs. In a case of interstitial nephritis, the same phenomenon occurred, the pressure rising to 240 mm. during an attack of asthma and dropping to 180 mm. at its close. He believes that the acute rise in blood-pressure is the cause of cardiac asthma, the distension of the insufficient left ventricle being of subordinate importance. The entire subject of paroxysmal hypertension deserves further investigation, which may throw much light upon the pathology of the circulation.

In the cases referred to above, however, it is by no means certain that the hypertension was not due reflexly to the pain or discomfort under which the patients were laboring.

TREATMENT OF HYPERTENSION.

Since hypertension may be a manifestation of any one of a considerable number of pathological conditions, it is evident that a rational therapy

must be based upon a recognition of the underlying cause. The fact, however, that the products of proteid decomposition in the intestine tend to raise the blood-pressure when absorbed, justifies a dietetic treatment of hypertension, even though factors outside the digestive tract are chiefly responsible for the condition. Such patients should tend to a milk and vegetable diet. Soups and gravies, since they are peculiarly rich in pressor substances, should as Oliver points out be entirely excluded from the dietary. Meats, of which most of us consume an unnecessarily great amount, should be reduced in quantity. Many patients thrive and are comfortable on an entirely meat-free diet; others, as Elliott points out, feel the withdrawal of meat keenly and for them a too rigid regimen would mean great discomfort. The reduction of the amount of meat taken by such patients to a small portion once or twice daily would probably be better than its complete withdrawal. Boiled meat, since most of its extractives have been dissolved out, may be given more freely than if otherwise prepared. Vegetables, fruits, starches, sugars and fats may be given freely. The amount of salt used should be reduced to the minimum consistent with palatability; if there is edema, the diet should be nearly salt-free. Fluids may be given freely unless there is cardiac embarrassment, in which case they should be restricted. Alcohol, coffee and tea should be forbidden or reduced to a minimum, and the favorable effect of an entire withdrawal of tobacco is often striking.

Excesses of all kinds, muscular, mental, dietetic and venereal must be avoided, although individual differences are great in this respect. In general, a sudden severe exertion, such as running after a street-car is more dangerous than more prolonged, but milder exercise.

Hydrotherapeutic measures are often useful. Warm baths may be given freely. Severe sweating procedures, as Miller and others have shown, are peculiarly effective in reducing high blood-pressure; they must, however, be used with caution if the cardiac function is impaired.

The drug treatment of hypertension is not often indicated. In view of the fact that a high blood-pressure is often a compensatory affair, it is perhaps fortunate that our depressor drugs are relatively inefficient. The action of the various nitrites has been studied by Wallace and Ringer, Miller, Core and others. Amyl nitrite and nitroglycerin produce a rapid and considerable, but fugitive, fall in pressure; the action of sodium nitrite is slighter, but more persistent. Erythrol tetranitrite is the most effective, but its value is greatly impaired by the intense headache it causes. The clinical place of the nitrites is in those cases of excessive hypertension, in which it is clear that the high blood-pressure itself is producing disturbances. Their action in all cases should be carefully watched.

Among less known drugs, used for the reduction of high blood-pressure, vasotonin, a combination of urethan and yohimbin, is advocated by Fellner and Staehelin, and guipsine, a glucoside obtained from the mistletoe, by Williamson.

LOW BLOOD-PRESSURE.

Infectious Diseases.—The acute infectious diseases are commonly accompanied by low pressure, which in most of them requires no treatment, sometimes as in the case of typhoid fever being even a conservative factor. In others, as in pneumonia where the chief danger to the patient

is cardiac weakness, the systematic taking of the blood-pressure is of value, since it gives us the earliest intimation of impending heart failure. Gibson holds that a "pressure appreciably below normal in pneumonia is invariably of evil omen, and any considerable fall bodes disaster. When the arterial pressure, expressed in millimeters of mercury, does not fall below the pulse-rate, expressed in beats per minute, the fact may be taken as an excellent augury, while the converse is equally true." Hare has been able to corroborate this view. In any case in which the blood-pressure, expressed as above, falls to the pulse-rate, active stimulation must be instituted, and the call for such measures is far better decided by the sphygmomanometer than by our older criteria of the failing heart, since it enables us to institute treatment more promptly.

In tuberculosis also the routine use of the sphygmomanometer is of value. Other things being equal, an abnormally low blood-pressure indicates an unfavorable prognosis, while a normal or somewhat high pressure justifies us in hoping for a good outcome.

Hemorrhage.—Wiggers has carefully studied the blood-pressure during and after severe hemorrhage and finds the behavior of the pulse-pressure, that is the difference between systolic and diastolic pressure, of special significance. "A progressive decrease in the pulse-pressure and especially a decrease in the product of the pulse-pressure and the heart-rate indicate a continuance of the bleeding. An increase of both, if permanent after several determinations, indicates a cessation of hemorrhage. A temporary increase of both, followed by a marked decrease on subsequent examinations, indicates an exacerbation." Wiggers has tested these rules both clinically and on animals and finds them very uniformly to hold true.

Hypotension after Salvarsan.—Sieskind finds that a fall in blood-pressure occurs constantly after the intravenous administration of salvarsan, in the usual dosage. In patients with normal hearts this fall in pressure is never so great as to endanger life. He considers it doubtful, however, whether we are justified, as advised by Weintraud, Geronne, Grassmann and others, in administering salvarsan for luetic disease of the circulatory apparatus. The cases of heart collapse after the injection of salvarsan, recently reported by Spiethoff, should make us very cautious in administering this drug to patients with impaired hearts. Salvarsan, he thinks, is definitely contraindicated in cases with a very low blood-pressure.

AORTIC REGURGITATION.

The only valvular lesion in which blood-pressure determinations give any diagnostic information is aortic regurgitation. In this condition, the diastolic pressure is very low as compared to the systolic, resulting in a high pulse-pressure. The latter may represent 50 per cent. of the systolic pressure. Hill has pointed out another phenomenon characteristic of this lesion. Normally, in a patient lying prone, the pressure, in the brachial and in the femoral arteries, is practically the same. In aortic regurgitation, however, the blood-pressure in the leg is constantly and considerably higher than in the arm, an observation which Hill considers pathognomonic of the disease. Hare has been able fully to confirm these findings.

THE NEWER CARDIANTS.

A REVIEW OF RECENT LITERATURE.

By WM. ENGELBACH, M. D., of the Editorial Staff.

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Recent developments, pertaining to the investigation of selective cardiants, deal almost entirely with the dosage and action of drugs or the active principles of the digitalis group. The application and dosage of these drugs have been made more accurate by an attempt at standardization, purification, absolute identification and isolation of the active prin-

ciples of the various members of this group. Attempts at definite standardization are being considered by a number of scientists in this country, who will report to the Revision Committee of the Pharmacopeia and the Department of the Pharmaceutical Association. No definite standards have been accepted up to this time, although a number of worthy methods and considerable research work have been advanced and adopted by certain investigators.

Houghton, in a paper before the American Medical Association, reviews the entire history of standardization and treats in detail the different methods involved. He gives the more improved methods as follows: *Quantitative assay*.—A quantitative estimation by pharmacological methods of the activity of the heart tonics is a much more difficult problem than is a qualitative assay. Any series of experiments would be necessary in order to decide what method or methods were best suited for this work. Too great a variation was exhibited in the results obtained from blood-pressure experiments on dogs, rabbits, etc., and such experiments are, moreover, quite a deal more complicated and difficult to carry out. He found that fairly accurate data could be obtained from the application of a solution containing strophanthin, digitalin, etc., to the exposed frog's heart, comparing the action of the drug thus tested with that of a sample of a known strength. This method, however, was finally abandoned for one which gives much better results. It seemed to him quite probable that the strength of the heart tonics could be determined from their killing power when administered to the lower animal.

Accordingly, rabbits, guinea-pigs, rats, frogs, etc., were employed for determining the minimum fatal dose of the drug. He finally chose frogs as being best adapted for this purpose. Different species of frogs vary considerably in reaction to the poisons, but the same species behave much alike. He has found it best to employ frogs of a nearly uniform size for the standardization of any particular tonic. Since it is impossible to obtain on the market frogs of exactly the same size, it is best, when one has a large number of samples to standardize, to have the frogs separated into lots by weight, those in each lot not varying over three grams; then one can use those weighing 14 to 17 grams for tincture of strophanthus, those weighing 18 to 21 grams for tincture of digitalis, etc. Frogs weighing less than 30 grams can be obtained at a very reasonable price from fishermen, as they are too small for the table. However, it is necessary that from the moment of capture they be handled with great care and kept in wet moss, etc., until they arrive at the laboratory, when they should be at once transferred to suitable ponds. The method of administering the poisons and observing results may be briefly stated as follows: Dissolve the strophanthin, or tincture of strophanthus, in normal saline solution. The strength of the medicated solution should be such that the total quantity to be injected shall not exceed 0.5 c.c. The fluid should be measured by means of very slender pipettes, graduated into hundredths, into round-bottomed capsules of about 1 c.c. capacity from which the last drop may be taken up in a narrow pipette having a long slender point, and the injection then made through the frog's mouth into the abdominal lymph-sac. Great care should be taken not to puncture the skin, as this will allow a portion of the injected fluid to leak out. After the injection, the frogs should be placed in wide-mouthed frog glasses, the plates containing about a quarter of an inch of water. It will be necessary to inject several series of about five frogs each for each sample of the drug to be assayed, a first series to the injected with

drug of known standard strength. After testing a large number of tinctures of strophanthus, he found that 0.00015 c.c. per gram body weight represented fairly well the toxic activities of an average sample of tincture prepared from strophanthus (Kombe). The minimum fatal doses of tinctures of strophanthus prepared from various lots of the drug obtained from the American market were found to be as follows: —

1.....	0.00015	8.....	0.00015
2.....	0.00026	9.....	0.00022
3.....	0.00015	10.....	0.00017
4.....	0.00012	11.....	0.00016
5.....	0.00013	12.....	0.00015
6.....	0.00015	13.....	0.00025
7.....	0.00010	14.....	0.00033

The several tinctures were prepared by one process and with the same menstruum.

The second series is to be injected with doses varying considerably in size. The third series is to be injected after the approximate dose of poison has been found from the second series. From the third series we may almost surely fix the minimum dose. A fourth series should finally be injected, which will fix the limits of strength very closely. The minimum fatal dose should kill at least three frogs out of five. If a less number die, it is best to inject another series with doses one point greater.

One very important advantage of the method above outlined for the assay of the heart tonics is the fact that various kinds and sizes of frogs may be employed at any season of the year, the only essential being that at the time the assay is made, the standard and unstandardized preparations should be tested at the same time, the frogs being exactly the same species and kept under exactly the same conditions, comparative results only being necessary, since the standard solution maintains its activity almost entirely unimpaired.

He later proposed strophanthin (Kombe) c. p., crystalline, as a stable, satisfactory, chemical standard by which to measure the value of the heart tonics of the digitalis series. With a great deal of care his colleague, Dr. D. H. Brauns, has prepared the standard strophanthin from strophanthus (Kombe) seeds, which were received in the original pods, as shown, from Mr. Lindsay, Curator of the Edinburgh Botanical Gardens and identified by the well-known pharmacognosist, Mr. E. H. Holmes, F. L. S., Curator of the Museum of the Pharmaceutical Society of London. The detailed results of their chemical and pharmacological studies will appear shortly. The strophanthin, which they have proposed as a standard, is obtained from the seeds by the following method:—

Seeds (strophanthus, Kombe, identified by Professor Holmes, London) carefully separated from the awns were ground to a fine powder and extracted with petroleum ether to remove fatty oil. The defatted drug was exhausted with strong alcohol by percolation, the alcohol recovered *in vacuo*, leaving a syrupy residue from which the strophanthin crystals separated on standing. These were then filtered out and recrystallized, giving as a final product the chemically pure strophanthin crystals.

In order to obtain considerable quantities of the crystals, a better method is to treat the dilute, syrupy, alcoholic extract with basic lead acetate, and then remove the excess of lead with hydrogen sulphide. The

strophanthin will remain in solution, from which it separates out on spontaneous evaporation. The separated strophanthin may then be purified by recrystallization from very dilute alcohol. The process of obtaining the crystals is so simple that any one having a supply of the genuine seeds can obtain material for the standard.

Summarizing his methods, pharmacologists recognize that the physiological action of digitalis, strophanthus, convallaria, etc., are so closely allied that they may be considered as one group, and may be physiologically assayed by the same method. The basis of the method of physiological assay depends upon the peculiar characteristic affinity of the heart muscle-tissue, which is most characteristically shown by cold-blooded animals, to the members of this group.

The test animals preferred are normal, healthy, medium-sized frogs of the *Rana pipiens* variety.

The M. F. G. of the unknown and the standard are obtained by injecting suitably sized doses under precisely the same laboratory conditions.

Strophanthin, Kombe, c. p., crystalline, is proposed as the standard by which the value of the members of this group shall be assayed. 0.000001 gram of this strophanthin is considered as the normal minimum fatal dose per gram body weight of frog, when properly injected into the abdominal lymph-sac, and corresponds in physiological activity to 0.000075 c.c. of standard (U. S. P. 1900) tincture of strophanthus, which represents the average activity of first-class commercial strophanthus, Kombe, seeds as they appear on the American market. Ten times a normal minimum fatal dose (M. F. D.) per gram body weight of frog represented by 0.000010 (0.000001x10) of strophanthin is considered as a normal Heart Tonic Unit (H. T. U.); hence, each gram of strophanthin contains 100,000 H. T. U.

The number of H. T. U. in any preparation of the heart tonics of the digitalis series, knowing the H. F. D. for *Rana pipiens* of the unknown and the known, may be determined by the formula:—

$$\frac{\text{No. of H. T. U. per (M. F. D. of standard)}}{\text{gram of standard (M. F. D. of unknown)}} = \text{H. T. U. of unknown;}$$

$$\text{e. g.: } 100,000 \frac{(0.000001)}{(0.000075)} = 1333 \text{ H. T. U.}$$

Since the M. F. D. of the unknown and standard is always tested under the same conditions at the same time, seasonal and other reasonable variation in the resistance of the test frogs will not make any difference in the end results, as the increased or decreased resistance is in the same direction and of the same degree:—

$$\text{e. g.: } 100,000 \frac{(0.0000009)}{(0.0000675)} = 1333 \text{ H. T. U.}$$

Besides the above methods of obtaining more accurate and stable preparations, the most notable advances concerning the isolation of the more efficient active principles have been made in regard to digitoxin and digipuratum. These principles, on account of their rapid action, have been given most consideration, and the following reviews reflect the opinions of the investigators in regard to the value of these elements as compared with other heart stimulants.

The active principle of the digitalis leaves, digitoxin, has rarely been

used for therapeutic purposes, as the crystalline preparation is dissolved with difficulty and may be prescribed only in fractions of a milligram. Furthermore, it has a tendency to disturb the stomach. Cloetta succeeded in isolating from the leaves an amorphous digitoxin, "digalen." This preparation, when given by mouth, does not give rise to disorders of the stomach. Experiments on animals, moreover, have shown hypodermic injections to cause no irritation. "Digalen" may be safely applied, therefore, per os, per rectum, intramuscularly and intravenously. Cloetta states that digalen has the advantage over the galenic digitalis preparations in producing a regular effect even in cases where digitalis proves ineffective. The effect ensues rapidly without a latent stage of development, the remedy, therefore, is of the greatest importance in weakness of the heart which suddenly supervenes in the course of acute infectious diseases.

According to Naunyn, the action of digitalis has its limitations in that the employment of the remedy becomes impossible if it is no longer tolerated by the patients, who then are precluded from its use, more especially so, if on a previous occasion it has been administered in too large doses followed by phenomena of poisoning. There also occur cases in which at the outset small doses are not tolerated. In such cases or when the remedy fails to take effect, the desirability of substitutes is felt. Naunyn tried many remedies, but did not find any one of them to be a suitable substitute, neither *strophanthus* nor the toxic constituents of *convallaria majalis* or of *laurus nobilis*. He has given much attention to digitoxin (Schmiedeberg) which he employed per os and by way of enemas; and he has observed good results even in some cases where *infusum* or *herba digitalis* failed. Its continued use, however, has an undesirable cumulative effect; the application per rectum likewise has its limits, owing to the irritation caused by it. He does not favor this mode of application. Generally, infusions of digitalis act more slowly than is sometimes desirable. In most cases the effect does not manifest itself until the third or even the fifth day, when the usual doses are given. This absorption stage is shortened in giving hypodermic injections of digitoxin soluble Cloetta. Doses of 0.3 milligram, applied from one to three times daily, produce an effect after twenty-four hours. Such rapid effect is of the greatest importance in the acute cardiac weakness in infectious diseases. Naunyn states that his remarks regarding Merck's digitoxin apply likewise to digalen, since this latter preparation is impure digitoxin. He also tried hypodermic injections, formerly of *inf. fol. digit.*, but the results were very unsatisfactory; the remedy was not tolerated by the patients, caused rigor, etc.

Walti administered digalen in severe cardiac incompetency and obtained very gratifying results in all his cases.

Bibergeil recommends digalen as being readily soluble in water, non-irritant, and easily diffused. A great advantage of this preparation consists in that it does not give rise to indigestion and loss of appetite, and that it agrees with patients who vomit after taking digitalis infusion. In its effect on the circulation system it is at least of equal value with digitalis infusion; over which, however, it has the advantages of admitting of exact dosage, of rapid action, and of apparently no cumulative effect. Its indications for use are the same as those of digitalis.

Kottmann used digalen intravenously and obtained the effect two to five minutes after the injection, there being demonstrable a sudden increase in blood-pressure which continued for at least twenty-four hours, in many

instances for several days. The frequency of the pulse was seldom influenced, but frequently the quantity of urine was extraordinarily large, as much as 8 litres in twenty-four hours. He emphasizes the fact that intravenous injections afford the possibility of rapidly producing a digitalis effect, and that this mode of application is of the greatest importance, particularly in cases of acute weakness of the heart, as in cardiac asthma. In the case of intravenous injection, the whole quantity injected suddenly takes effect, whilst the rapid excretion presumably prevents intoxication.

In the majority of his cases Klemperer obtained good results after the administration of digalen, a stronger pulse, abatement of dyspnea, and considerable diuresis with the disappearance of edemas. In several cases, when administered per os, it seemed to display a genuine digitalis action; and Klemperer recommends the preparation as a substitute for the frequently unreliable leaves, since it permits of exact dosage.

Kollick concludes from his observations that digalen is more reliable than the infusion of digitalis leaves, that its dosage is more accurate, and results are obtained more quickly. Furthermore, no undesirable effects were noticed, as in all instances the drug was well tolerated.

The experimental work of Baccarani shows that: 1. Digalen produces a rapid effect on the blood-pressure and diminishes the frequency of the pulse. 2. Such effect on the vascular system continues for some time after taking the remedy, but does not last very long. 3. The drug is to be administered, therefore, in fractional doses several times daily; and as it is well tolerated, the patient is not thereby inconvenienced. 4. The diuresis increases considerably, doubtless owing to the increase in the blood-pressure.

In the experiments of Hochheim, digalen proved to be a good cardiac tonic. It increased the blood-pressure in cases of arrhythmia, exerting a regulating influence on the action of the heart, as it does away with, or considerably diminishes, at least, the number of extrasystoles. If the action of the heart is greatly accelerated, it diminishes the number of the contractions. In states of congestion, due to disturbances of compensation, it produced a pronounced diuretic effect. The copious diuresis manifested itself in most instances during the period from the second to the third day of the digalen treatment; and after discontinuing the use of the remedy, the quantity of urine excreted during twenty-four hours generally exceeded the normal quantity for several days. With the increase of diuresis the phenomena of congestion subsided. The hypodermic injections generally gave rise to burning pains, lasting from one to several hours; and occasionally to soft swellings, which in some instances did not disappear for a few days. By resorting to intravenous injections, local phenomena of irritation may be entirely avoided. Symptoms, that might be regarded as toxic disturbances, were not observed. Nausea, vomiting, diarrhea or giddiness never manifested themselves. In Hochheim's opinion digalen enables one to obtain a reliable digitalis effect—more especially in urgent cases—by way of hypodermic or intravenous injection. Hence, this preparation must be regarded as a very valuable remedy in cases of pronounced inclination to vomit and in unconscious patients after laparotomy, more especially after operations upon the stomach.

Haffter made use of digalen in a severe case of Basedow's disease, which defied every other treatment. An injection of two grams reduced the frequency of the pulse (144 to 160) almost to normal (96 to 100), at which it remained during seven to eight days. After that time a

further injection was necessary. Since the employment of this treatment, the condition of the patient has improved.

De Renzi draws the conclusion that Cloetta's drug has the same action as digitalis; but the employment of the new preparation is more convenient, more reliable in effect and unattended by bad effects. Cumulative and irritant effects after its administration are far less likely to ensue than after the use of digitalis.

In comparing digalen with digitoxin, Ceconi and Fornaca conclude that the former displays its action with equal rapidity and has the following advantages: 1. It admits of much more convenient dosage and affords greater facilities in the mode of application. 2. It agrees better with the patients, both as regards single doses and the total quantity used during the treatment. 3. Phenomena of intolerance, more especially such symptoms as are due to accumulation of the remedy in the organism, are of very rare occurrence.

Haberfeld entertains a similar opinion that digalen is non-irritating to the stomach, is rapid and non-cumulative in action, on account of its rapid excretion through increased diuresis; further it admits of exact dosage and is always constant in composition.

Thurnheim corroborates the advantages of digalen as stated by the preceding investigators. Moreover, in his experience it sometimes gave results in cases in which digitalis proved ineffective.

Maass administered digalen intravenously and recommends this preparation for its harmless effect and rapid action.

Freund remarks that digitalis therapeutics, as long as we were dependent on the drug, was often unreliable, whether digitalis was given in the form of infusions or in powder. The amount of efficacious substances, contained in the leaves, is known to differ very much according to the place, the time of the year when they are gathered, and the age of the drug. These disadvantages, he believes, are absent in the case of digalen. The solution does not spoil and keeps a long time without losing the digitalis effect. It has a further advantage, which not one of the digitalis preparations hitherto in use possessed—namely, it may be applied hypodermically, and thus affords the possibility of using it in the case of patients who are subject to vomiting and, as a consequence, are unable to take anything orally. He refers to digalen as the first solution of digitalis that permits intravenous application, and thus renders possible an almost immediate effect; whereas, after hypodermic injections, it takes two hours, and after other modes of application twelve to twenty-four hours for the effect to set in. According to his experiments it produces prompt and lasting effects. Even after a dose of only five drops, introduced into the lymph-sac, a distinct digitalis effect sets in after a quarter of an hour. The systoles become more pronounced and more prolonged (from one second to sixteen seconds). This effect continues for about an hour; if further doses are employed, the action of the heart becomes irregular. If dropped directly on the heart, the same curves result. He remarks that with regard to weakness of the heart occurring in infectious diseases, the modern digitalis therapy places at our disposal an important remedy in the form of this digitoxin, which enables us to combat it by way of hypodermic, intramuscular and intravenous application. It acts more intensely than camphor and caffeine and more rapidly if employed in the form of intravenous injection, this latter being the only form to be considered in case of impending collapse. This observer reports his successful administration of the drug in weak-

ness of the heart after chloroform-narcosis and in a case of acute dilatation consequent on over-exertion.

Livierato states that digalen produces a rapid effect, which is one of its principal advantages in practice. It is well known that the infusion acts slowly and that the effect is always preceded by a latent stage of development. Such latent stage is considerably shortened by the employment of this preparation of digitoxin. Its rapidity in producing an effect proves its practical value in cases of unforeseen weakness of the heart, as appears in acute infection. Digalen exerted a considerable and constant influence on diuresis; the quantity of urine increased from 650, 800, to 3,200 c.c. At the same time the specific gravity decreased and the albumin no longer appeared in the urine. The diuresis continued to be copious during the next few days. Such increase in diuresis doubtless is a consequence of the rise in the blood-pressure. The rise, however, ensues rapidly, and in the case of hypodermic injections of from 2 to 3 c.c. it sets in in twelve to thirty hours after the injection. If still larger doses are resorted to, the effect on diuresis is even more pronounced, as well as on cardiac dulness and blood-pressure.

Mann's experiences induce him to attribute to digitalis a much greater value than to strophanthus. However, it cannot be denied, he says, that the usual tincture of digitalis is frequently very slow in action. Among the efficacious preparations are the digitalin granules (Nativelle) and the digitoxin, recently discovered by Cloetta, which is soluble in water. A study of the various cases shows that the results obtained with the latter are substantially identical with those derived from the use of digitalis, viz., enhancement of the blood-pressure, regulation and decrease of the pulse, modification of the general disturbances in keeping with the re-establishment of the circulation. An increase in keeping in diuresis and simultaneous decrease of the edema, as well as other concomitant phenomena, dyspnea, sense of anguish, etc., were invariably in evidence.

Pittini and Pietro conclude from their experiments that digalen may be employed with good results in all cases of cardiac diseases in which the use of digitalis is indicated. The more convenient form of application, the more exact dosage, the stability of the preparation and, above all, its rapid effect, lead to the conclusion that, in producing this remedy, Cloetta has succeeded in placing at the disposal of the profession a very valuable agent for the treatment of cardiac diseases.

Avanzino comments upon the marked diuretic effect of the soluble digitoxin and recommends this preparation on account of its serviceability. Schwyzer found digitoxinum Cloetta to be superior to digitalis preparations in the market. It was employed in all cases in which the use of digitalis was indicated. If administered by the mouth it produced an effect more rapidly than digitalis powder; after hypodermic or intramuscular application the effect occurred in a few hours; intravenous injections were followed by an effect immediately. Digalen had no cumulative effect and did not last as long as digitalis. But as soon as the digalen effect had been obtained, it was maintained by small doses. Its principal advantage consists in that it admits of almost painless hypodermic application; and that in urgent cases it may be employed by way of intravenous injections with immediate results.

Reitter noticed improvement in myocardial degeneration after the administration of Cloetta's digitoxin. In arrhythmia the beneficial effect was unmistakable, provided the cardiac muscle was not too greatly af-

fects. Such rapid effects could not be produced hitherto with any of the other preparations in use. Another advantage consists in the absence of phenomena of poisoning.

In the treatment of cardiac and renal lesions with digalen, Marini refers to the increase in the tonus and the lessening of the peripheral arterial pressure. These facts, he believes, are dependent on the lessening of the vascular tension. Owing to the fact that the drug reduces the tension of the renal vessels and thus causes a more extensive and more rapid flow of blood, it gives rise to a copious diuresis. Digalen, according to Marini, is preferable to digitalis, because it rapidly exerts a regulating influence on the function of the heart, as it does not give rise to a cumulative effect; for, even in the event of its use being continued for a long time, the remedy seldom causes a serious irritant effect. Digalen, which is very serviceable in chronic lesions of endocarditis and myocarditis, is likewise productive of excellent results in the case of nervous cardiac disturbances and in protracted infectious diseases.

The sphere for the use of digitoxin, according to Marr, is extensive. It slows and strengthens the impulse of the heart, is a good vascular stimulant, and its peculiar renal effect constitutes it an ideal diuretic. It is indicated in rapid and weak action of the heart, low tension of the arteries, dyspnea, pulsating jugularis, dark complexion, scanty and dark colored urine, and general hydrops. It is one of the best aids in the first stages of pneumonia and many other states of inflammation. In the early stages of scarlatina it is a most serviceable drug.

In a case of cirrhosis of the liver, accompanied by defects of the mitral valve, Cramer observed that the use of digalen was followed by a rapid and lasting digitalis effect on the pulse and general condition before, as well as after, the puncturing of the exudation. A favorable influence was exerted on the diuresis at the same time; but when the use of the remedy was discontinued, the diuresis diminished again.

Freund states that this amorphous substance does not only dissolve more readily in water, but is also more easily diffusible than the crystalline glycoside; and it is to this fact that he attributes the superior wholesomeness of digalen as compared to digitalis leaves and to the infusions prepared from them. Not only does digalen apparently affect the stomach less than digitoxinum crystallisatum, but it also affords the possibility of obtaining a digitalis effect without the medium of the stomach, viz., by way of hypodermic and even intravenous injections of the amorphous modification of the original substance, thus giving the benefits of digitalis therapy to many patients with whom the digitalis leaves do not agree.

Kohn believes the greatest sphere for the use of digalen is cardiac disease with disturbances of compensation, or with renal complication, in which cases it may be administered per os or subcutaneously. It proves likewise useful in cases of moderately advanced degeneration of the cardiac muscle, and in diseases of the aorta accompanied by mitral insufficiency.

According to the observations of Calzolari, during pregnancy digalen diminishes in an almost constant manner the frequency of the pulse, enhances in most cases the blood-pressure, and always increases the excretion of urine. Its effect sets in rapidly and lasts at least two hours. It has never given rise to contraction of the uterus nor has it injured the fetus in any way whatever.

Pesci resorted to digalen treatment in the treatment of pneumonia and

found that the preparation exerted a very favorable influence on the pulse, on the blood-pressure, as well as on leucocytosis, since it causes the crises. He also recommends its employment in purely aortic insufficiency with cardiac asthma or angina pectoris. In the latter case, he says, a great rise in blood-pressure is no contra-indication; and in attacks of angina pectoris the drug may be employed intravenously. If it is desirable to produce a rapid effect as, for instance, in severe cases of cardiac asthma, the remedy should be employed intravenously; which method is advisable also in the case of cardiac insufficiency in acute infectious diseases, such as pleuritis, pneumonia, etc. He accentuates the fact that, as compared to other similar preparations, and to digitalis itself, this preparation has the advantage of admitting exact dosage and thus precludes certain drawbacks and dangers, and ensures the desired effect. Its greatest and indisputable advantage, however, consists in that the remedy is pre-eminently suitable for intravenous injections; and this form of application becomes imperative in urgent cases, and frequently so in cases where digitalis is not tolerated by the stomach. Intravenous injections always produce reliable, rapid and good results.

Hale has carefully studied the action of digalen in comparison with other digitalis preparations. He reviews the literature, showing that certain claims made for digalen are incorrect; that it is not devoid of cumulative action; that it possesses marked irritating properties resulting sometimes in edema and thrombosis; that it causes disturbances of digestion apparently as often as the older preparations; and that its effects do not appear more rapidly than from corresponding doses of the leaves of digitalis. Other investigators are quoted who show that digalen has no special properties in acute cardiac failure; that its effects did not appear more quickly when given subcutaneously than by the mouth. Intravenous injections, however, gave results in two to five minutes, but the doses required were so large as to render this method of administration dangerous. In regard to the experimental work on animals, it was found that digalen is much less active than the crystallized digitoxin. The experimental work of Hale showed variations in the strength of digalen, indicating that deterioration occurs with age. In a comparative study of the action of digalen, digitoxin and digitalin, this author found that digalen is much less active than crystalline digitoxin, and of about the same potency as digitalin. This lends weight to the contention of some observers that digalen is not identical with digitoxin, but is only a high percentage of digitalin. With regard to the general action of digalen on animals, it appears to possess considerably more stimulant action on the central nervous system than other digitalis preparations. In most cases, the early symptoms of absorption were convulsive movements. This agrees with the clinical effect, observed by Teichman, of excessive nervous stimulation following intravenous injections. In regard to digipuratum, Hale concludes from his biological tests that it is constant in composition, and appears to be an assayed product. As to its efficiency, he believes it to be of the same activity as the strongest official preparation on the market. From his experiments Hale could draw no conclusions as to the presence or absence of secondary toxic effects following the use of digipuratum.

Focke also reports unfavorably on the action of digalen. He bases his conclusions upon experimental and clinical studies of the action of this product.

Boos, Newburgh and Marx discuss the comparative value of the more

recent active principles of digitalis. The greater part of their work has been done with digipuratum. It was tried in 108 cases. Eight cases are considered in detail. Special illustrations and charts are included in the article, which exhibit all the phases in the activity of digipuratum. It has long been known that one of the factors which renders digitalis medication difficult is the tendency of this drug to produce gastro-enteric disturbances. It was with the hope of lessening the irritant action of digitalis that Gottlieb essayed, by chemical means, to remove the digitonin from the leaf-extract. He succeeded in obtaining a product which is free not only from digitonin, but also from 85 per cent. of the other bulky and inactive matter, which ordinarily passes into a leaf-extract. When Gottlieb compared the action of his purified product with that of the original leaves, he found that he had recovered practically all the digitalin and digitoxin contained in the crude leaves. To this purified product Gottlieb gave the name of "digitalis depuratum," or "digipuratum," for short.

This purified digitalis extract is a yellow liquid. The active principles contained in it are insoluble in cold water and acids, but easily soluble in dilute alkalies, a property which ensures their ready absorption from the intestine. The yellow fluid is standardized physiologically and is then taken up with sugar of milk to form a powder. The powder obtained is further diluted with sugar of milk until the resulting product has a definite and constant pharmacological strength. In his physiological tests Gottlieb uses *Rana temporaria* (the German field frog), obtained during the months from July to October, and kept in captivity as short a time as possible before use. His unit of strength is the minimum amount of the extract, which in thirty minutes will cause systolic stoppage of the heart of a frog weighing 30 gm. This quantity Gottlieb calls a "frog unit." By standardizing a large number of the best leaf-powders obtainable, Gottlieb found that the ordinary dose of the powdered leaves, 0.1 gm., varied in strength, in the different samples, from 4 frog units to 12. Eight frog units being the average, Gottlieb chose this strength for his purified extract. Digipuratum is therefore prepared as a powder having the constant strength of 8 frog units to each 0.1 gm. of the powder, corresponding to the average strength of a single dose (0.1 gm.) of the crude powdered leaves. For greater convenience of dosage, digipuratum is usually dispensed in tablet form, each tablet containing 0.1 gm. of the powder. These tablets have an agreeable vanilla flavor, and are taken readily by all patients. In the treatment of broken cardiac compensation, Boos, Newburgh and Marx gave the drug as suggested by the clinicians mentioned—namely, in the form of so-called treatments; that is to say, they employed the ideal digitalis medication, giving large doses in as short a time as possible. They were enabled in this way to determine if the drug, when given in sufficient quantity rapidly to produce its physiological effect, is really free from the irritating substances which usually make similar dosage of the crude drug an impossibility, and to determine if, under these circumstances, this drug exhibits a lesser tendency to produce cumulation than the crude preparations. They gave digipuratum as a rule in treatments of twelve tablets in four days; four tablets the first day, three the second day, three the third day and two the fourth day (that is, 12 gm. or 18 grains in four days). In many of the more serious cases, they were obliged to continue the drug in doses of one or two tablets for a longer or shorter period.

Each of the 8 cases shows interesting features. The diuresis is ef-

ficient in all the cases. In one case the diuretin probably played little, or no part in producing the phenomenal urinary output. Four cases show the marked effect of digipuratum on the slowed pulse-rate. The most remarkable case was a patient sent into the hospital in a moribund condition and little hope for her life was entertained. She reacted very quickly to digipuratum, however, and compensation was established in a week. The patient has been under the care of either Boos, Newburgh or Marx since leaving the hospital. At first she needed two tablets of digipuratum daily for several months; after that the dose could be gradually diminished until now, after one year, she takes on the average only four or five tablets a week. At times she goes a week or ten days without the drug. She is comfortable, looks after her household duties, and makes many visits, although she lives up one flight of stairs. The physical signs are the same as when she left the hospital. In some of the cases the first digipuratum treatment gave little or no result, while the second was very efficient. Four cases illustrate the good results which may often be obtained by combining digipuratum medication with venesection, or the removal of fluid from the body by tapping. In the second case the efficient diuresis which began on the tenth day was due to a combination of digipuratum with the fluid extract of apocynum. The blood-pressure was rarely affected. There was no vomiting or diarrhea in any of the cases. Digipuratum has now been in use at the Massachusetts General Hospital for over a year, and more than 180 cases of primary heart disease, or secondary cardiac involvement, have been treated with it. The effect on the urinary output had been very prompt in most instances. There was not a single case of vomiting or diarrhea; in fact, the vomiting of a number of cardiac patients at entrance was promptly stopped by the drug. Cumulative poisoning has never been observed. One of the early patients, a boy of sixteen, was given 106 tablets in six weeks; at no time was there any suggestion of digitalis poisoning. In one or two instances, the house officers were made uneasy by sudden drops of forty or more beats in the pulse-rate, but no disagreeable symptoms followed in any case. It must be borne in mind, however, that digipuratum is a digitalis preparation, and that as such it must necessarily have a tendency to produce poisoning by cumulation. But as regards this drug, the tendency is much diminished, so that it is possible by means of this agent to push digitalis therapy in a manner heretofore unknown.

SURGICAL AND MEDICAL SHOCK.*

A REVIEW OF RECENT LITERATURE (SINCE 1899).

By J. R. GERSTLEY, M. D., of Chicago.

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The student, considering the cause of death following severe trauma, or following laparotomy, and then turning to the bedside and seeing the fatal termination in typhoid and other septicemias, must observe that frequently the clinical pictures in all these conditions are much alike. Can the apathy, the pallor, the thready pulse and the sighing respiration in all these conditions be traced to one identical, original source? Much has been written upon this subject, and much can be learned from the opinions expressed. Let us first turn to the fatal depression following trauma or laparotomy—the typical surgical shock.

The cause of this phenomenon has been much disputed. At first, many claimed that the heart was the great factor. Others considered the nervous system to be at fault, still others included heart and vessels, and finally Crile, whose work we all know, brought forward the idea that surgical shock was due primarily to failure of the vasomotor centre. The vessels lost their tone, the blood stagnated in the viscera, and the heart finally failed, for lack of work to do. Under these circumstances heart stimulants could be of no value—as he proved—and he looked for other means of supporting the circulation. The object in view was to find some means of forcing the blood engorging the viscera, out into the general circulation, and he now turned to mechanical means. Saline infusions theoretically should be ideal, as they should supply fluid for the still sound heart to work upon, but for some reason or other they did not prove as successful as might be expected. Still determined to find some agent giving tone to the vascular system, Crile used adrenalin and found in this a powerful drug, but its effects at best are only temporary, and when it is stopped its value ceases at once. It must be given intravenously, continuously, and by the hour to be efficient, and this is almost impossible. Finally, when all the work was through, Crile decided that the very best means that he had of supporting blood-pressure for any continuous time was by bandaging the extremities, or better yet by a pneumatic suit, with which he could mechanically raise and sustain arterial tension sometimes 75 mm. of mercury.

Not analyzing his results, but thinking only of the theory upon which they were based, the profession took to the use of intravenous infusions which are practised indiscriminately even to-day, but a careful review of the work of Allport, Balloch, Kemp, Hare, Cushing, Eisendrath and Straus, and Bloodgood, brings out the fact that in severe shock infusions are worthless unless hemorrhage has been present. The tendency seems to be to use infusions less and less for the purpose of stimulation, and more and more for the purpose of flushing out toxins in toxemia and supplying

fluid to the tissues in cases of dehydration as in cholera. An enormous amount of work has been done upon the subject, but experimenters have never gotten beyond the stage of adrenalin and the mechanical suit. Two advances, however, have been made. First, Locke's solution has been substituted for plain sodium chloride. Much experimental work has been done upon the toxicity of pure sodium ions, and the conclusions from experimental and clinical observations are that the sodium-calcium solutions are more beneficial. Secondly, Stewart and Pike working at the University of Chicago have brought out the point that cardiac action is dependent upon intracoronary pressure. When they perfuse the coronaries of an isolated heart with fluids at a pressure of 80 mm. of mercury, the heart starts beating. Crile at once takes advantage of this in his new scheme of resuscitation. Admitting that intravenous infusions of dilute adrenalin have not been attended with the happiest results, he injects the infusion into an artery and *toward* the heart. This wave of increased pressure is transmitted into the coronaries and the results are better than the older intravenous method. The latest texts on surgery recognize this scheme as valuable.

Now, while all this work on therapy was being carried on, the principle upon which it was based, was being undermined. Malcolm in England, Porter and Quinby, and Seelig and Lyon in this country, have shown definitely that in surgical shock the peripheral vessels are contracted, not dilated, and that the vessels are still under nervous control. The work of the latter observers particularly, has been most conclusive, but they do not explain the fall in blood-pressure which invariably accompanies severe shock. And here the matter stands. Until the recent work of Henderson of Yale, we may say that even after the enormous amount of work upon the subject, all we know about surgical shock is that it is accompanied by a fall in blood-pressure, that this fall is combated temporarily by adrenalin and more permanently by a pneumatic suit—and that intracoronary pressure is an essential to cardiac activity.

Now let us turn to the medical side of the question. Here we have a toxemia, a poisoning of every part of the body, and the question as to the primary cause of death becomes more complicated. That there is a fall in blood-pressure in many severe infections, there can be no doubt, but whether this fall is due primarily to cardiac or to vasomotor weakness, or to both, is still not absolutely settled. The writings of Blake and Cornwall, particularly in regard to pneumonia, and of Secor rather emphasize the importance of cardiac weakness. On the other hand, Janeway, Robinson, Broadbent, Miller, Worster, Williamson, Sonnenkalb, Stowel, Hare, Howland, and Hirschfelder, either call attention to the fact that in many cases of death from septicemia, there are not sufficient pathological findings in the heart to account for this termination, or else they directly blame the failure of the vasomotor centre. Indeed they show that often in uncompensated heart trouble blood-pressure may be raised. Much experimental work has been done upon the subject. The pioneer researches of Romberg and Pæssler go to show that in acute infections it is vasomotor failure that kills. The heart functionates to the last. Krehl examined quantitatively fatty changes in hearts from septic cases and found too little fat to markedly impede the work. Aschoff and Tawara, after examining hundreds of sections, concluded that many pathological findings in hearts were artefacts. Hasenfeld and Fenevessy found that hearts poisoned with phosphorus were still capable of respond-

ing to increased demands. Heincke showed that in peritonitis respiration failed first as it did in surgical shock. So the concensus of opinion is that in many fatal cases of medical disease, heart failure is not the primary cause of death, but is secondary to failure of the vessels. With this idea in view, identically as the surgeons were working, so did the medical men begin studying the effect of drugs upon blood-pressure, and like the surgeons, medical men were considerably disappointed. The work of Pæssler and Miller experimentally, and of Cook, Stowell, Webster, Cabot, Brown, and Howland, all show that our well-known drugs, as alcohol, strychnine, digitalis, etc., are not as effective as was thought. Almost every observer has decided that some one drug is of value, usually caffeine or camphor, but the results are at such variance that nothing has been gained except to show that vasomotor drug therapy is not a great success. Like the surgeons, the medical men tried infusions, and with similar results, and so still other means have been employed in combating the fall of pressure. Howland, after a most excellent review of the subject, finds that cold air is far more efficient in raising and sustaining blood-pressure than is any drug. He finds children with pneumonia have a pressure sometimes 15 mm. higher when out of doors than when in the ward, and thinks that this is the reason that the open-air treatment is more effective in winter than in summer. Webster, Osler, and Edwards value the bath highly, and Brown finds Nauheim baths in pneumonia of greater value than any medication. Interesting is it to see how medical thought runs parallel to surgical. Not satisfied with the results of drug therapy, arguing on a basis of vascular failure, the profession has now taken to the use of adrenalin. The writings of Miller, Calderon and Floersheim in this country, and Falta and Ivocie, Haeberlin, John, Ed. Koll, Von der Velden, and Lichtwitz and Hirsch abroad, speak of the great value of this drug in elevating blood-pressure and thus sustaining the heart, the only danger being in causing too great a rise of pressure for the heart to overcome. Indeed, the infusions as a vehicle are given up, and the ordinary 1/1,000 extract is given either intravenously, intramuscularly, or subcutaneously. The writers speak most highly of this drug and indeed there seems in these medical cases an unusual indication for it, for some recent work goes to show that in shock occurring in septicemias there is a deficient amount of adrenalin in the circulating blood. So to sum up then, in fatal medical, as well as surgical, cases, death occurs at times when the heart does not seem at fault, and where the only explanation of the decreased vascular tonus *has been* in failure of the vasomotor centre. In combating this condition, medication has failed, infusions have failed, and finally not satisfied, the profession has found the most powerful remedy in adrenalin. In surgery, as accessories, the pneumatic suit, bandaging and posture are employed, and in medicine, cold air and the bath.

Until recently no absolutely satisfactory explanation of the fall in blood-pressure has been offered, since the disproving of the vasomotor theory. Now physiology steps forward with Henderson's acapnia theory. As this was recently reviewed in an editorial of this JOURNAL, we shall just touch upon it. Henderson has shown that excessive breathing causes a marked diminution in arterial carbon dioxide, oxygen being unchanged. Now carbon dioxide is the natural stimulant of the respiratory centre, and when it is removed in large amounts as in excessive respiration from pain, or by escaping from the abdomen during a laparotomy, respiratory failure may occur. Indeed, this is the usual form of

death in shock. In the great majority of Crile's experiments, respiration ceased first, while the heart continued beating for a short while, and many clinical observations bear out the same truth. However, if a second stimulus to respiration, as pain, is present, then the centre will functionate even if the carbon-dioxide content in the blood is insufficient. As a result secondary changes develop. Due to the acapnia—the diminished carbon dioxide—changed osmotic conditions prevail in the circulation and sodium chloride and fluid leave the veins for the tissues. Consequently not enough blood is brought to the right heart, then comes a secondary fall in blood-pressure, though the vasomotor centre is working its hardest to maintain tension, and finally the heart fails for lack of fluid to work upon,—not from vasomotor failure, but from venous failure. Henderson has done a beautiful piece of work and his results are most convincing.

This theory of venous failure, like the others, is not without some medical equivalent. In 1906 Sewall wrote on the physiology of the veins, and remarked on the important factor in cardiac activity of high or low venous pressure. Indeed, forty years ago Fisher compared the depleted circulation in cholera to that in profound shock—in which intravenous infusions were only a temporary aid and then escaped rapidly into the tissues. In acute infections likely to end in shock there is retention of salt and water, and Weselkin has shown that an atmosphere of 5 to 10 per cent. CO_2 has considerable effect upon temperature.

So we see that the new acapnia theory may be of some value to medical men. Indeed, Hirschfelder in his latest work upon the heart thinks the excessive breathing in infections, from fever and toxemia, may be a factor worth considering. Is it not interesting to see how the advances in surgical and medical thought upon this subject have gone hand in hand for the last ten years? Whether this new theory, like the use of adrenalin, will perhaps become more useful to the medical than to the surgical profession, time only will tell.

CONGENITAL HEART DISEASE.

A REVIEW OF RECENT LITERATURE.

By ALFRED FRIEDLANDER, M. D., of the Editorial Staff.

1. Reilly and Smith: Heart Disease in Infancy and Childhood. (*Amer. Journ. of Obstet. and Dis. of Women and Children*, May, 1910.)
2. Fetterolf and Gittings: Anatomy of Child's Heart. (*Amer. Journ. of Obstet. and Dis. of Women and Children*, February, 1911.)
3. Pekar and Tezner: Studies of Heart Function in a Case of Congenital Ectopia Cordis. (*Jahrbuch fuer Kinderheilkunde*, September, 1910.)
4. Fulton, Judson and Morris: Congenital Heart Shock Occurring in a Father and Two Children. (*Amer. Journ. Med. Sciences*, September, 1910.)
5. Luna: Congenital Heart Lesion with Hemiplegia. (*La Pediatría*, April, 1910.)
6. Weber and Dorner: Pulmonary Stenosis and the Secondary Blood Changes. (*Lancet*, I., p. 50, 1911.)
7. Wachenheim: Congenital Heart Lesion without Cyanosis. (New York Academy of Medicine, Section Pediatrics, October 3rd, 1910.)
8. Graham: Congenital Heart Lesion without Cyanosis. (Philadelphia Pediatric Society, October 11th, 1910.)
9. Kohl: Congenital Malformation of the Heart. (*Centralbl. fuer. Allgemeine Pathol.*, XX., p. 1089.)
10. Krostein: The Closure of the Ductus Botalli. (*Archiv. fuer Gynæcologie*, Bd. 90.)
11. Bauer: Congenital (syphilitic) Myocarditis. (*Allgemeine Wiener Medizin. Zeitung*, May 17th, 1910.)

Reilly and Smith have carefully analyzed 50 cases of heart disease as found in dispensary practice. The 50 cases occurred among 1,500 cases of all kinds treated between March, 1907 and June, 1909. They thus constituted $3\frac{1}{3}$ per cent. These 1,500 cases were essentially medical and the figures thus give a very fair idea of heart involvement. Among these 50 cases, there were 4 of congenital heart disease, giving a proportion of 8 per cent. of the heart cases. If the percentage of congenital hearts is estimated on the basis of the whole 1,500 cases, the percentage of congenital lesions is 0.3 per cent. Of the 4 cases, the ages varied from five and one-half months to nine years. The history given was either that the baby had been a blue baby at birth or that the mother had noted an abnormal heart action from birth. In the two older children the chief complaint was shortness of breath. As is usual in the congenital lesions, the definite diagnosis (anatomic) could not be made.

Fetterolf and Gittings made sections and dissections of the bodies of infants, which had been injected with 10 per cent. formalin and then frozen. The horizontal position of the heart in infancy was well exemplified. At its greatest depth the heart reached from sternum to vertebræ. The blood from the inferior vena cava was directed upward by the Eustachian valve and not to the left as is commonly supposed. The foramen ovale lay in an almost horizontal plane and was not vertical. The bicuspid orifice was practically vertical and opened to the left and slightly forward. The mitral orifice lay in a plane practically at right angles to that of the bicuspid. The relation between the thoracic viscera was very clearly pointed out by these sections, and certain special peculiarities of physical diagnosis in very young children, otherwise not satisfactorily explained, were made perfectly clear. For those interested, the original article may be consulted with great profit.

Pekar and Tezner had the opportunity of making a detailed study of the heart action of an infant with complete congenital ectopia cordis during the first week of life. The autopsy later showed that there was a patent foramen ovale polydactylism. The cardiogram showed nothing specially abnormal. Despite the anomaly, the heart showed rhythmic contraction of its several portions. Respiration was very shallow, and its effect upon the cardiogram therefore not particularly marked. The authors then studied the effects of mild galvanic currents upon the heart. It appeared that as a result of the passage of the electric current through the heart, the action of the heart was greatly accelerated. Closure and, to a greater extent, opening of the current caused marked, short contractions partaking of the character of extrasystoles. As a result of stimulation of the vagus, there was a marked slowing of the rate of heart contraction, sometimes indeed a temporary stoppage in diastole. Fulton, Judson and Morris report the cases of a father (*æt.* forty-two) and two children (one in the first year of life), all of whom showed definite Stokes-Adams syndrome. Degeneration of the auriculoventricular bundles could be apparently excluded by the authors, who regarded the condition as being congenital, resting either on anatomical or physiological basis. They point out that a pulse of 42-60 in a child under one year of age, without very marked symptoms, is of itself of the greatest rarity.

Luna reports the case of a three and one-half-year-old child who had been perfectly well up to the age of one and one-half years. After a fit of crying, with vomiting, this child suddenly showed a right hemiplegia with aphasia and marked cyanosis. Examination showed a marked systolic murmur in the second left intercostal, with marked accentuation of the second aortic, and clubbed fingers. The diagnosis made was of congenital heart lesion, pulmonary stenosis, patent foramen ovale, followed by hemiplegia.

Weber and Dorner report the case of a man of twenty-nine with evident pulmonary stenosis. As a result of a careful series of studies of the blood picture, they believe that in this case (and in all probability in other similar cases) there is really an increased blood production. In these cases with marked cyanosis and polycythemia there is thus a *plethora vera* and an increased blood production in the bone-marrow. This process is to be considered a compensatory one.

Wachenheim presented to the New York Academy of Medicine a child of six in whom a diagnosis of open interventricular septum with pulmonary stenosis had been made out. There was a loud murmur below the pulmonary site. In spite of the cardiac lesions there was no cyanosis.

In the ensuing discussion La Fetra said that he probably saw one case a month (in dispensary) of congenital cardiac lesion without cyanosis. It should be kept in mind, on the one hand, that marked congenital murmurs with no cyanosis are not at all uncommon, and, on the other hand, that there may be extreme cyanosis and clubbing of the fingers with absolutely no murmur to indicate the heart deformity. In all doubtful cases, blood examinations may be of value, since high hemoglobin and a red count of over 5,000,000 would indicate congenital heart disease. (This could not include the newly born, in whom it is well known high hemoglobin and very high red counts are the rule.—Ed.)

Graham showed a case (before the Philadelphia Pediatric Society) of a girl of five, whose heart lesion had been discovered at the age of fourteen months, during an attack of bronchitis. At nineteen months she had chicken-pox, at two and one-half years, measles, at five years, lobar pneumonia of the right lung. The heart was decidedly enlarged, the right heart being markedly enlarged. There was cyanosis only after exertion, though the child was always pale. A loud systolic murmur was heard over the entire chest. The latency of the case, the absence of cyanosis, the possibility of such a badly damaged heart withstanding both measles and pneumonia, made the case of exceptional interest.

Kohl reports a case of congenital heart anomaly. The aorta consisted of two parts, the aorta ascendens which sprang from the left ventricle, but immediately divided into three branches: the right innominate, the left carotid, and the left subclavian. The vessel, corresponding to the aorta descendens, sprang from the pulmonary aorta through the medium of the ductus Botalli. As is usual in such cases, there were other anomalies in other organs, viz.: changes in lungs, etc.

Krostein discusses the theories of the mechanism of the closure of the ductus Botalli. The view of Thomas rests upon the view that a slowing of the rate of blood-flow is concerned in the closure of the duct. After birth the pressure in the aorta becomes greater than that in the pulmonary, so that there is necessarily a slowing of the stream in the ductus. The ductus then contracts and is finally closed by proliferation (fibrotic) of its intima. In addition, Kohl believes that other factors concerned in the closure are elastic muscular fibres in the ductus intima which develop in fetal life in a symmetrical way. Furthermore, another factor is the changed position of the heart, which occurs with the first breath and which leads to a swelling of the division point of the pulmonary, thus also favoring closure of the ductus.

Bauer describes the case of a girl of thirteen who had suffered for some years with palpitation and pain in the extremities. There was pigmentation at angles of the mouth, periostitis on both tibiæ, and splenic enlargement. With this there was dilatation of the left ventricle and bradycardia with increased tension. The Wassermann reaction was positive. The author classes this as a case of congenital syphilitic myocarditis and arteritis.

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AMENDING THE PURE FOOD AND DRUGS ACT.

The Supreme Court decision in the Johnson case is not to serve as a license for all sorts of quack jobbery, or to furnish the music by which unscrupulous nostrum vendors are to keep their fiddles going for the dance of death. Whatever hopes the charlatans may have had in this direction are doomed to disappointment, as, indeed, every thinking person anticipated. The President's recommendation for an amendment to the Pure Food and Drugs Act was a logical sequence to the action of the Supreme Court in the case in question; and this refers both to assenting and dissenting opinions, between which there was not really the fundamental difference that many supposed. Both amounted, in effect, to a declaration that the domain of therapeutic virtue in a drug or a remedy offered two separate spheres of evaluation: one involving a mere opinion, the other a question of fact; the former unamenable to legislation, the latter well within the scope of law. The difference between Mr. Justice Holmes, for the majority, and Mr. Justice Hughes, for the minority, lay in their respective conclusions as to the side of the line upon which the case at bar fell, and as to the power of the present law properly to divide the two spheres.

In his opening sentence Mr. Justice Holmes made it clear, in a general way, that the Johnson case embodied a fraud, but not such as could be hit by the present law; and in his closing paragraph he pointed out in what respect such a fraud might possibly be imported within the meaning of the Act. It is really the same principle which runs through Mr. Justice Hughes' more elaborate dissenting opinion, which, however, he holds to be covered by the present law. But, whatever our individual view of the two arguments, the majority opinion must perforce be accepted

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as the authentic interpretation of the law; and all that now remains to do is to amend the law so as to embody the principle thus enunciated by both majority and minority. The decision practically amounts to a challenge to do so.

It was not likely that such a challenge would go unheeded by Congress, even if the President had not lent his official influence; and a motion to amend had already been made in the House prior to the President's action, but his recommendation will give it the character of an administration measure, and do much toward promoting its passage.

The formulation and enactment of an amendment to meet the situation will not be easy. In view of the Supreme Court ruling in the *School of Magnetic Healing* case, it would appear to be a task of some nicety to import into the law a regulation of therapeutic claims which will stand the test of judicial interpretation. And it might as well be frankly admitted that certain dangers do lurk in a legislative attempt to arbitrate therapeutic standards. But most of the exploited dangers are those which threaten the quack manufacturer's pocket-book; and the outcry is for the most part the cry of "wolf" raised by the wolves themselves.

The bogey of "unconstitutionality," which doubtless disturbs many law-abiding citizens, need scare nobody. The constitution distinctly invests Congress with absolute control of interstate commerce, even to the implied recognition of a "system of medicine" if it should choose to do so. But of course it will not; and the agitation on this score is wholly gratuitous. The fact is, nothing mandatory is contemplated in this phase of the Act at all. It is a negative restriction, and can be nothing else. It is the principle of all reputable schools of medicine, and of medical science in general, that they guarantee no cures; hence such a negative prohibition as that which the law proposes to apply to medicines, so far from being repugnant to medical freedom, is wholly consistent with it. There is, in short, in such a law, no question of establishing a system of medicine, but, on the contrary, of preventing false claims to any infallible system of cure.

Nevertheless, the problem is a knotty one. Without doubt the curbing of false and impossible claims for nostrums and quack medicines is a consummation devoutly to be wished. But, without doubt also, to attain this end through the agency of law—especially of interstate law—is by no means the simple, straightforward matter that some of our enthusiastic friends seem to think, or that even the presidential message would suggest. The mere addition of a misbranding clause to include false statements of therapeutic effects will not avail much, for sheer therapeutic claims are, and must always remain, pure matters of opinion, and a hundred statutes cannot make mere opinion the gauge of a crime.

To be sure, Congress might appoint a board of censorship to pass upon all medicinal products before they become eligible for interstate shipment; but, even if its constitutional power to do this be conceded, we hardly think it would take so extreme and questionable a step.

So far as we can see, two courses are open to Congress by which the Act may be strengthened and broadened in the direction contemplated. It may amend the language of the misbranding clause so as specifically to cover false statements of the pharmacological and physiological effect of remedies; and it can include in its provisions a blanket prohibition of false therapeutic claims so far as they relate to facts, leaving it to the courts, in individual cases, to determine this factual relation. The first of these amendments would at once import within the meaning of the Act all that class of cases, referred to by Mr. Justice Holmes in the closing part of his opinion, where a commendation of the remedy would, to all common understanding, amount to an implied statement of the contents of the package. The second would open the statute to at least a consideration by the courts of therapeutic claims, from which they are at present entirely shut out by the Supreme Court decision. And, even though a future ruling should invalidate the new provision, yet its restraining influence would in the meantime be salutary, and its outworking would doubtless lead to some practical solution of the problem, so that in time an adequate relief might be found.

When all is said and done, however, the purgation of the label does no more than touch the fringe of this particular question. So far as fraudulent therapeutic claims are concerned, the real menace to the public interest lies, not in the label, but in the advertising done by the nostrum makers and quacks. If, and to whatever extent, the Pure Food and Drugs Act can be made to apply to false and misleading therapeutic claims on the label, it ought to be appreciable to the advertising matter, both that which accompanies the packages and that which is transmitted through the mails, including newspaper advertisements where these circulate between States. Interstate newspaper advertising must, of course, be taken care of by State law.

This, also, we recognize to be a rather difficult and touchy matter to handle, and one which has its inherent limitations. Here and there, sporadic attempts have been made in this direction by State legislatures, which have come to grief at the hands of the courts, largely, we think, because they have been too extreme, and have sought to make the newspapers themselves responsible, which is a good deal like making the railroads responsible for the misbranding of the packages they carry. But, as stated, to whatever extent the labels are subject to regulation by law, it would seem that the advertising matter should be equally amenable to

similar regulation; and if anything worth while is to be accomplished in the way of public protection, it will have to be. To restrict the label and not the advertising is like holding a man to account for a libelous utterance by mouth while permitting him to circulate a slander by mail or newspaper with impunity. Now that the question is up, it would, it seems to us, be an opportune time to make a clean sweep of the whole field.

THE SIXTY-SECOND ANNUAL SESSION OF THE AMERICAN MEDICAL ASSOCIATION.

The presidential address at the meeting of any corporate body of medical men is always of moment; but in the case of the American Medical Association it is fraught with the greatest importance to the community, since it represents the attitude of this splendid organization to the medical and lay interests which are uppermost in the minds of all thinking men. In his address before the sixty-second Annual Session, at Los Angeles, in June, Dr. John B. Murphy, the President, did not slur over the needs of the hour in a way that would be declarative of the sort of optimism that views all things through rose-colored glasses. Not that we would convey the idea that Dr. Murphy's tone was not hopeful; but, by making certain pointed statements unweakened by the circumlocutory methods usually pursued in annual addresses, he brought home to all, who have watched the evolutionary stages of medicine in this country, certain truths which should not be forgotten.

Of all the salient features of Dr. Murphy's address, his remarks on the advisability of clinics during the session of the Association are most opportune. Is it not a fact that the profit which accrues to the average medical man, attending a session of the American Medical Association, is sadly hampered because of the multiplicity of papers which are read and the lack of the only leaven which could activate his languishing interest—namely, clinics?

That this innovation at the sessions would be their greatest asset cannot be denied by anyone who has possessed his soul in patience, despite the onslaughts dealt by droning voices pouring forth apparently endless disquisitions, and who may have had a glimmering that, by being taken to the bedside of a patient, a restoration of drooping spirits and a furtherance of knowledge could be effected. And now that the word has gone forth that clinical teaching should be added to the programme so that the sessions shall have the *cachet* of being educational, it would seem to us that the House of Delegates should not think too lightly of this matter.

Another important point in Dr. Murphy's address was what he said

about the present status of the physician. At those times when our superficiality in regard to this vital matter asserts itself, we are ready to declare that at no time in the history of medicine has the physician been so prosperous; though when we take the trouble to look into the matter with greater scrutiny and divest ourselves of what we think should be, the thought must occur, that granted the elect are greater accumulators of money than were their congeners in the past, the rank and file are not so well off. This state of affairs would not be so deplorable if the average man would be content to lumber on in a state of content on a stipend that does not grant him the wherewithal to meet his growing expenses; but things being otherwise, we see, as Dr. Murphy emphasizes, that he is forced to deteriorate into a quack, an advertiser, a commission man, a fee divider, etc. Of course, we do not mean that every average man in the profession loses his self-respect to the same degree; but, since he must live decently, the temptation which comes his way by the many avenues which are tributary to the practice of medicine is certainly an ever-present lure when the increased cost of living has to be met.

As regards medical education, Dr. Murphy made some pertinent statements which show that he has thought deeply on the subject. His plea that it does not follow that, just because a departmental head is an original investigator and a laboratory expert, he is necessarily a good teacher, one who has the art of pedagogy at his fingers' ends, is excellent enough to give us pause for some time; for the tendency to-day is to be firmly convinced that the "scientific researcher" is so far superior to the man who was "chosen for the chair" some thirty years ago—"chosen" because he was prominent on account of a large and lucrative practice—that to deny him any of the virtues of a teacher would be sacrilegious. But to tell the truth the art of pedagogy—and who can deny that it is an art?—is not always allied to original investigation; hence, as Dr. Murphy says, would it not be better for "the president and the faculty of a university to elect as teaching head of departments men capable of imparting information with force and in such a way as to be grasped, appreciated and retained by the student body"?

All those physicians who are interested in the newer note in medicine should read this presidential address in an intelligent and receptive mood, since it comments upon the problems which are with us at present. It is well in its way to say that these are matters so difficult of solution that only in years to come may a hope be entertained of a desired fulfilment. Now though it may be right to contend in this manner if conservatism is the fetish to be respected, it is wholly wrong if a change can be effected by radical methods that take small note of time, but have the high virtue of righting what is wrong in any community or organization, be it medical or lay.

OPINION AND CRITICISM.

THE OPEN AIR.

Although it is a fact that the circumambient air has always been at our beck and call to do with it as our sanity should dictate, it has been only in the last few years that it has really occurred to the thinking part of the medical profession to utilize it as a means to an end—the alleviation of those mental and physical disabilities which have withstood the kindly and even harsh intervention of medicines in a way that was baffling, to say the least. How the thought arose, that the respirable fluid of vampiric qualities, which had been excluded from our homes as one would shut out the pest, was not after all an enemy of man, but a beneficent ministrant at all times, is not within the knowledge of the present writer; but let us hope its evolvment into an unassailable fact was slow, since it is a matter of history that when facts are not too suddenly evolved from chaos their chances of longevity are better. Now though we may be vague when it is a question of historical exactness, what can be asserted with assurance is that to-day the appreciation of the curative qualities of air is high enough to warrant the statement that many Almroth Wrights will have to be forthcoming before there is any vitiation of our enthusiasm.

It would be a twice-told tale to hark back to those primitive times,—not so far distant, by the way, as pointed out by Bernard Shaw in his play “The Doctor’s Dilemma”,—when consumptives were immured in tight-closed rooms lest a breath of fresh air should not only bring on a harassing cough, but cause a fresh cold to be produced. All that is ancient history, or rather shoved back into remoteness by our shamefaced confession of one of our many ignorances. But just because we have rectified this mistake, should we sit with folded hands, happy in the thought that our work is complete? This is not the opinion of those medical investigators who are at present stirring the waters of our customary apathy. According to them, much can be accomplished by the intervention of open air, and if the reader is at all in doubt we would refer him to Dr. S. Pozzi’s exceptionally well-written article “Les Fous En Liberté (Open-Door)” in the French publication, *Aesculape* for April, the Berlin letter by Professor Bickel in *Folia Therapeutica* for April, “The Open-Air Treatment of Acute Infectious Diseases” in *Public Health* for May, a method pursued with gratifying success at the Nottingham (Eng.) City Isolation Hospital, and the numerous articles in the German lay and medical journals on the “Nature Theatres” of Germany for the cure of nervous diseases.

Thus is made apparent even to him who is not too readily convinced, that the open air is arriving at the distinction of being an undeniable asset in the armamentarium of the modern physician, which for unexplainable reasons never deigned to accept it before now. No doubt there will always be those amongst us who will laud the efficacy of drugs to the exclusion of "natural" medication, but even so, the propaganda for more and more open air in the treatment of certain diseases will not suffer, since it already stands foursquare, and moreover has behind it the sanity which must win in the end.

ON MEDICAL INSTITUTIONS.

In a story recently published in one of the weekly literary papers, the mother of an injured child protests against sending the child to the hospital for fear of his being "cut up," and is only persuaded as to the wisdom of the course by the strenuous attitude of the hero, a base-ball player. It is not often that a member of a professional base-ball team is called upon for this function, but it is often enough the fate of sick persons to be kept from institutions when it is necessary for them to be there. Fortunately the antagonism to hospitals on the part of patients is being rapidly dissipated by experience of patients in the modern houses of rest. Likewise the art of knowing when to send the patient to the hospital is being better developed by the physician. Whereas formerly only extreme surgical cases were considered sufficiently ill to demand hospital treatment, now obstetrics is being done wholesale in institutions, and it is recognized that severe medical cases will also be benefited by a stay in a good hospital. The value of good nursing and proper regulation of the environment, often impossible in the private home, is receiving its just recognition, and the demand for increased medical services in all large general hospitals is the best indication of the increased supply. In the cities this supply is recruited from patients both of the "private room" and of the "ward" classes. It is not difficult to find the reason for this. Among the private patients the luxury of the hospital is almost a necessity for their wellbeing, whereas with the free patients the close association of dispensary, hospital and social service corps makes it easy to impress the patients with the advantages of the hospital as compared to the situation at home.

So far we have only mentioned treatment, but by far the most important rôle of the hospital in its relation to the patient and the physician is that of assistant diagnostician. The modern institution has all the necessary aids for diagnosis—clinical as well as laboratory—that are possible in the equipment of most physicians in private practice, and on that basis has the logical right to all "doubtful" cases. In the institutions for special cases, the better detailed treatment will rest upon a larger

experience in diagnosis,—special sanatoriums for the treatment of certain diseases, therefore, have a clear call for support.

We do not by any means wish to give the impression that the present system is ideal. Though we believe that the tendency of the times is good, there are many errors which will be corrected as progress advances. The idea of sending every patient to an institution is, we are sorry to believe, too often due to self-interest on the part of the physician, and not to a desire to improve the patient or to advance medical knowledge. Further, the hesitancy to use private patients for clinical purposes is not good. It can do no harm, and generally speaking the more a "case" is studied, the better results are attained in the therapy of the "case." And as a final word we register a protest against the plan of many institutions, which gives the rich or the poor the very best of medical attention, but pays scant regard to those whose means are too modest for a private room and yet too large for the public ward. This error is, however, a fundamental one in medical practice, and applies as well outside as inside an institution. Perhaps were physicians compelled to pay for medical advice, the truth of the last remark would be intensified by the force of sad personal experience.

LITERARY NOTES.

That tantalizing question, What is the origin of life? has been made the subject for an elaborate study in Dr. H. Charlton Bastian's "Origin of Life" just published by Watts and Company of London. To appreciate the author's contention, the reader must first strip himself of all those mystic interventions, in the matter of evolution, with which from youth upwards he has, so to speak, cluttered his mind; and then close the door tightly lest they rush in unawares. Granted that this can be done, Dr. Bastian's explanation is easily understood, and for simplicity deserves high commendation. As the author says: "If a genesis of living matter occurred in some one place in far-remote ages, and if such a process can be shown still to occur, it would be only natural to conclude that the same chemico-physical processes have, in all probability, been operative in innumerable regions over the surface of the earth, not only in primeval but in all succeeding ages up to the present day. I have long held such a belief * * * this belief has, during the last four years, been notably strengthened by the results of experiments, many times repeated, made with inorganic materials, and now to be further referred to." To illustrate how readily this may be done, the author writes: "All that will be needed are some tubes of soft soda glass, similar to those that I have employed, a strong can containing a quart of colza oil, a good thermometer, some distilled water, and three or four simple chemicals (sodium silicate, ammonium phosphate, dilute phosphoric acid, and liquor ferri

pernitratis). No incubator is necessary. The sealed and superheated tubes may be left at rest inside a closed south window for one, two, three or more months before opening them and most carefully examining their contents. The last point is all-important, for without the exercise of much care it will be easy enough for an unbeliever or even a hasty observer to fail to discover any organisms." So here one has the whole perplexing problem in tabloid form, and if materialism reigns supreme in the reader's mind what can be easier than either to make the experiment or accept the author's word, not only as regards the experiment, but as an indisputable proof that life began in a similar lowly fashion, though all the metaphysicians through the ages may contend that the intellect can work its way back to remote times, but must call a halt when the origin of life has to be defined. This is graphically shown in M. Henri Bergson's "Evolution Créatrice," a translation of which has recently been published by Macmillan and Company, and in which the metaphysical view of evolution is set forth to the complete satisfaction of all those readers, whose attitude to this vastly interesting subject is the sort that is in sympathy with the science of metaphysics. But all students are not of this ilk; hence Dr. Bastian's exposé is not without its value. If the writer of these lines may be permitted to give advice he would say, read both books most carefully, for by doing so the thought may arise in the reader's mind that though materialism, as illustrated by the chemical retort, and metaphysics are antipodal when brought to bear on how life really began, it is nevertheless far better to know both sides of the question than to exclude one or the other.

The *Strassburger Post* of recent date contains an interesting article on comparative thirst in European Countries. The Dane, for instance, annually consumes 104 litres of beer, almost no wine, and 24 litres of cognac. The Swede quenches his thirst with 56 litres of beer and 9 of alcohol; while the Norwegian, on account of the stringent laws obtaining against the sale of liquor, compels himself to exist on 31 litres of beer and 3 of cognac. In Russia the amount of beer and vodka that is drunk per head is small,—5 litres of each; but in France the quantity runs considerably higher,—32 litres of beer, 10 of cognac, and 108 of liqueur. The Englishman shows a liking for 6 litres of whisky or gin, 2 litres of claret; but he shines especially when the quantity of ale or stout is considered, for according to statistics he annually consumes 152 litres! The Hollander contents himself with 38 litres of beer and 8 litres of cognac; although for his neighbor, the Belgian, 221 litres of beer and 9 of alcohol are necessary. The Austrian and the Hungarian take the same pace as regards schnaps (11 litres), wine (16 litres); but, when it is a question of beer, the Austrian true to his German proclivities outstrips the Hungarian by drinking 80 litres to the latter's 11. Of all the inhabitants of Europe the

distinction of drinking, the smallest amount of beer and alcohol belongs to the Italian, who drinks 2 litres of the former and one of the latter, but owing to the cheapness of wine we find that he consumes 98 litres of this beverage annually. As regards the German Empire, if we take it in its entirety, including Luxemburg, the statistics for that very thirsty country are 125 litres of beer, 7 of wine, and $6\frac{1}{2}$ of alcohol per each individual; but if we examine each state separately, we see that the inhabitant in the North of Germany and the Alsacian drink 98 litres of beer, while the inhabitant of Baden consumes 158, the Wurtemburger 169, the Bavarian 240. By comparing the great beer drinking centres, the amount assumes astonishing figures, for the Berliner has 200 litres to his credit, the Nuremberger 325, the Frankforter 432 and the citizen of Munich 570.

It would be a dereliction on the part of any editor, who has the interests of medical journalism at heart, not to notice the June issue of the *Edinburgh Medical Journal*. In this Centenary Number there are a number of excellently-written articles on Sir James Y. Simpson, the most personal being the one written by his daughter, which tells in a most charming manner those traits in one's character without which any pen-portrait is incomplete. Although the medical world of to-day is not forgetful of what this pioneer in the administration of chloroform did to alleviate suffering, the emphasis placed upon his endeavors by the publication of this Centenary Number should not be considered a matter of supererogation, for by bringing together a number of essays, descriptive of Simpson's activities, a larger view is given us and many reminders to show that we really did not know as much of his life as we should. Of course, as all of us know, the celebration of the centenaries of great men has been somewhat overdone of late; but in this instance there is nothing to cavil at, since out of Simpson's perseverance and industry, in the matter of finding an anesthetic other than ether, a discovery was given to the world which marks one of the great epochs in medicine. Of the triumvirate of discoverers of anesthesia, Morton and Simpson are not without honor in their respective countries; but as regards Wells, his name is well-nigh forgotten in his native land, though Paris is at present making an attempt to collect funds toward the erection of a statue so that some honor may be shown a genius, whose neglect by the medical world, especially by the American contingent, is a blot on our civilization.

ORIGINAL ARTICLES.

THE CLINICAL SIGNIFICANCE OF CERTAIN FORMS OF ALBUMINURIA.

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The purpose of this paper is to discuss certain forms of albuminuria, which are by no means rare in practical clinical experience and which, generally speaking, are not sufficiently appreciated by the profession. The following forms come under consideration:—

1. Simple continuous albuminuria.
2. Orthostatic (vasomotor) albuminuria.
3. Residual (post-nephritic) albuminuria.
4. Chronic non-progressive nephritic albuminuria.
5. Hypertensive albuminuria.

1. *Simple Continuous Albuminuria; Illustrative Case.*—A few months ago a young married man, aged twenty-nine years, was referred to me for advice with regard to the presence of albumin in his urine. He first became aware of its existence one year previous, when he was rejected at life insurance examination because of Bright's disease. During the intervening year his urine had been repeatedly examined and always with the result of finding albumin present. His habits were abstemious and he denied having had any illness since early childhood. He declared himself in good health and had experienced no symptoms. On physical examination his heart was found to be normal in size and the heart tones clear. Pulse 72, blood-pressure 120 mm. There was a second degree floating right kidney. The twenty-four-hour collection of urine amounted to 1,200 c.c., had a specific gravity of 1,022, and contained 2 per cent. albumin (centrifuge). Routine observation of the urine has been conducted, many specimens being analysed with the result of finding albumin present in each specimen. In addition to serum-albumin almost every specimen tested gave the acetic acid (euglobulin) reaction. The amount of albumin varied within a considerable range, apparently under the influence of bodily activity. No casts have ever been found in the urine sediment. Maximum albuminuria 5 per cent. bulk.

The foregoing is a good example of a type of albuminuria that is by no means rare. It is impossible to determine in the case cited, how long the albuminuria has existed and what was its genesis in the first instance. Although only eighteen months since the condition was accidentally discovered, it is probable that its origin dates well back toward childhood. This presumption seems a fair one when we consider the frequency of harmless albuminurias in childhood and early adolescence, especially in males. Tiemann (*New York Med. Journ.*, March 17th, 1894) found the frequency of albuminuria in children and adolescents from ten to twenty years of age to be 22 per cent. as against 9 per cent. above the age of twenty-one years. Albuminuria of the vasomotor type, beginning in early life, may persist beyond the pubertal period into adult life, requiring at times many years for its complete disappearance. The so-called vasomotor (orthostatic) albuminuria of childhood and early adolescence is usually marked by the presence in the urine of the acetic acid reaction (euglobulin), and the fact that the case cited gave this reaction would throw weight in favor of interpreting the condition as a hold-over from such an albuminuria arising in early life. The absence of casts and the normal cardiovascular system furnish proof of its harmless character. I dismiss the fact of the right floating kidney as unimportant in the etiology of my case. It is not sufficient explanation for the continuous nature and severity of the albuminuria. It is undoubtedly true that a floating kidney, especially when the degree of displacement is great, may give rise to albumin and albumin and casts in the urine. That such cases may be mistaken for nephritis, we have amusing proof in the statistics of Edebohls in his book on the "Surgical Treatment of Bright's Disease." The albuminuria of floating kidney is usually of slight grade, is intermittent in character and is rarely observed in the male, although it is among males that the so-called harmless albuminurias are most frequent.

Simple persistent albuminuria is a condition which may exist for years without apparent detriment to the individual. One may follow such cases for long periods, as I have in a few instances, notably in two young physicians, without any other indication of kidney disease making its appearance. We are very apt, and quite rightly, to attach importance to albuminuria when it exists in early adult life. The fact that it may occur and continue for long periods as an innocent manifestation should be more fully appreciated. The essential features of this type of albuminuria are its continuous character, its independence of changes in position, and the absence of the other urinary signs and of the organic secondaries that characterize nephritis. Hyaline casts are not unknown in these cases, but unsupported by other evidence of nephritis they need be given little weight in diagnosis. Considerable care is necessary to identify cases of simple albuminuria. An opinion is to be expressed only after repeated examination and after determining the absence of

cardiovascular and retinal secondaries. Most of these cases are treated as obscure nephritis. This is an injustice to these individuals as much harm is done them; for by rigid diet and restriction of their activities they may become converted into invalids, whereas what is needed is normal activities, a full nourishing diet, and general tonic measures.

2. *Orthostatic (vasomotor) Albuminuria; Illustrative Case.*—In February, 1905, a slim but well-developed lad, aged twelve years, was brought to me on account of albumin in his urine, which had been accidentally discovered in the course of a routine examination by the family physician. The family history was excellent and the patient's personal history devoid of more important illnesses than measles, whooping-cough, and two mild attacks of tonsillitis. The only symptoms recently complained of were occasional headaches and one attack of acute indigestion induced by overindulgence in candy. The boy was of a decidedly nervous temperament and displayed a degree of vasomotor instability indicated by flushed cheeks, dermatographia, moist, clammy hands, and low tension compressible pulse. Physical examination of lungs and abdomen was negative. The heart boundaries were normal and the heart tones clear. Blood-pressure was 110 mm. in the recumbent position and 100 mm. sitting, the reverse of normal. Blood examination showed a slight anemia. The day's urine amounted to 1,000 c.c. and contained one per cent. by centrifuge of serum-albumin and a distinct acetic acid reaction. Each urination during the day was separately tested for albumin with the following results: No. 1, passed before rising in the morning, contained no albumin; No. 2, passed after breakfast at 9 a. m., patient meanwhile not having stood, was also free from albumin; No. 3, voided at 11 a. m., patient walking about, containing 2 per cent. bulk of albumin; No. 4, voided at 2 p. m., after a brisk walk and the usual midday activities, contained 20 per cent. bulk of albumin; No. 5, at 5 p. m. showed 3 per cent.; and No. 6 at 8 p. m. also 3 per cent. albumin. It was only after searching five slides of the sediment from the albuminous urines that casts could be found, and these were purely hyaline in character and only three in number. This patient is still under occasional observation and has been during the six years since the first consultation. The last clinical record made was March 31st, 1911. His urine still contains a trace of albumin at midday; no casts. His blood-pressure is 120 mm. sitting and 110 mm. lying. General physical examination negative. The lad has developed normally being now at the age of eighteen, 5 ft. 11¾ inches in height, and he weighs 153 pounds.

The albuminuria in this case displays the characteristics of the orthostatic form coming on only after the upright position is assumed, reaching its maximum during the middle portion of the day and declining in intensity toward evening (Pavy's Cyclical Albuminuria). The inverted blood-pressure record, higher while lying than when upright (the reverse or normal), is a characteristic of these cases and indicates their vaso-

motor origin. The acetic acid reaction (euglobulin, nucleo-proteid?) is also a suggestive indication, as it is present in a majority of the cases.

Orthostatic albuminuria is the most interesting and one of the most frequent forms of albuminuria encountered in early life. It is met with most frequently in young lads at or about the age of puberty and is due to arterial hypotonus in the splanchnic circulation. In the normal individual, the vasoconstrictor mechanism is sufficient to overcome the drag upon the blood-mass constituted by the force of gravity, when the upright position is assumed, and thereby the systemic blood-pressure is maintained, rising indeed slightly above pressure-level of the lying position—an overcompensation due to the activity of the vasoconstrictors on the splanchnic circulation. In certain individuals there is a failure of this mechanism to act efficiently so that blood collects in the capacious splanchnic vessels in the upright position. In consequence of this engorgement, static hyperemia of the kidneys results, the renal filter is forced, and albumin appears in the urine. A condition somewhat similar in the method of its production is sometimes observed after prolonged debilitating diseases such as typhoid fever when, during the early part of convalescence, the vasomotor mechanism seems to be off guard, and albumin appears in the urine for a time after the resumption of the upright position.

The upright position is in itself sufficient to bring albumin into the urine. Exercise will not increase it, indeed appears at times to diminish its amount, and neither activity nor passive movement in the recumbent position has any such effect. Individuals developing this symptom are usually thin and long-waisted, subject to blushing, nose-bleeds, and vertigo, and are usually, although not exclusively, males. Although most frequently originating about the period of puberty, it may last with diminishing intensity for many years. It does not lead to nephritis although a form of albuminuria closely resembling it may be the aftermath of acute nephritis occurring in children, as shall presently be described. It is time for the profession to more generally realize that vasomotor albuminuria is a distinct and harmless syndrome; that it is a frequent happening during adolescence; that it is not to be adjudged as nephritic in origin, but is to be granted a favorable prognosis, and is to be treated in a very different manner from nephritis.

The following procedures are suggested as means of identifying these cases: First and most important is the careful comparison of the systolic blood-pressure between the lying, sitting, and standing positions. The pressure is to be first taken while the patient is lying flat upon the back, then again immediately after, while he is sitting, and again while he is standing, the level of the sphygmomanometer being of course raised with each test until even with the heart. In orthostatic albuminuria there is an immediate fall of from 10 to 20 points in blood-pressure on the assumption of the sitting position; a deficit which may be slightly added

to when the patient stands upright. In a patient under observation two years ago the systolic pressure fell from 125 mm. in the lying to 95 mm. after rising to the sitting position. Change in posture caused a drop from 110 mm. to 90 mm. in another of my cases.

Secondly, the different urinations of the day voided into separate bottles on a two-hour schedule should be serially tested for the quantity of albumin present, and a curve of the albumin excretion made in this way. It will be found to pursue a more or less definite cycle, absent in the urine of rest, at its maximum toward noonday, declining steadily toward close of the day. The specific influence of the upright position should be tested by devices that will at once suggest themselves. This latter precaution is necessary because in almost all forms of albuminuria there are daily variations in the amount of albumin, the minimum being found in the morning. Daremberg and Moriez (*Revue de Médecine*, Sept., 1902) found only two exceptions to this rule in 100 observations. The time of occurrence of the maximum is somewhat uncertain and may, in different cases, vary between 11 a. m. and 5 p. m. The specific effect of change of posture alone is peculiar to orthostatic albuminuria.

Thirdly, the urine should be tested for the acetic-acid (euglobulin, nucleo-proteid?) reaction. The method is as follows: Dilute 3 to 5 c.c. of the urine to be tested with 5 to 6 times its volume of cold distilled water and acidulate strongly by adding 2 to 3 c.c. of 50 per cent. acetic acid cold, not heating. A diffuse cloudiness follows the addition of the acid, and this is euglobulin or nucleo-proteid. The urine of orthostatic albuminuria almost invariably shows this reaction. Although not absolutely characteristic of this form of albuminuria, since it occurs under other circumstances, it may be looked upon as a strongly corroborative sign, and may generally speaking be taken as indicating the comparative harmlessness of the albuminuria. The more abundant this reaction, the better the prognosis.

Many of these cases do not show casts in the urine-sediment even when the urine is heavily charged with albumin. This paradox does not hold good for every case, as hyaline casts may often be discovered if careful enough search is made for them. Unless the casts are of a degenerative type or are present in persistent and increasing number they should not be allowed to outweigh other considerations in arriving at the diagnosis of a harmless albuminuria.

3. *Residual (post-nephritic) albuminuria; Illustrative Case.*—In 1907 a young girl of sixteen was brought to me for advice regarding an albuminuria of two years' duration. The albuminuria had its origin in an acute nephritis complicating tonsillitis occurring in 1905 and characterized by edema and a high grade albuminuria. Although recovery had taken place in all other respects, the albumin never entirely disappeared from the urine. Except for a slight degree of anemia and a faint systolic murmur (hemic) over the heart, physical examination showed

nothing abnormal. Cardiac outlines were normal. Systolic blood-pressure 90 mm. (Stanton). The urine, many specimens of which were analysed, always gave plain reactions for albumin and frequently the acetic acid reaction as well. The type of albuminuria was continuous and slightly cyclical. No casts were ever found in the urine sediment. Twenty-four-hour quantitative analysis normal. The albuminuria was looked upon as of a harmless nature, and the patient was put upon an iron tonic and sent into the open air. Observation of this case has been continuous covering a period of four years. During the first two years the albumin persisted in the urine and then disappeared. For two years the urine has been uniformly free from albumin. There are no cardio-vascular changes. The present blood-pressure is 110 mm. (Faught). Although never a robust girl, the patient has developed in an average manner.

This form of albuminuria merits careful consideration. The name which has been given it—residual albuminuria—signifies its origin in a precedent condition which is usually, although not invariably, an acute nephritis. The type of albuminuria sequential to an acute nephritis may vary. In certain instances of which the foregoing case is a good example the albuminuria never exceeds the minimal type, but is continuous, the trace of albumin in the urine being practically constant. In other cases, and perhaps as frequently, the albuminuria assumes the cyclical character of the vasomotor type, and no doubt many a case of so-called orthostatic albuminuria has had its origin in a mild, acute nephritis complicating an infection of childhood, the urinary condition having escaped detection at the time through lack of routine analysis. The albuminuria, being discovered subsequently, it is interpreted, according to its type, as a primary vasomotor phenomenon. In common with the other albuminurias of early life already described, the urine frequently displays the acetic-acid reaction in association with serum-albumin, the reaction marking the case as of a harmless nature.

Next to acute nephritis the condition most frequently productive of residual albuminuria is nephrolithiasis. An attack of renal colic will often start an albuminuria that may be perpetuated for weeks and months, but without systemic evidences of a progressive nephritis. In post-mortem work it is a frequent experience to see in the kidneys indications of healed lesions, scars, or areas of atrophy showing where localized inflammatory processes once existed and became healed without detriment to the organ as a whole. It is possible for such localized transient foci of disease to give rise during their existence to a simple albuminuria without general indications of nephritis and which after a period disappears leaving its origin unexplained.

One of the most important, because least recognized, forms of albuminuria is that sequential to acute nephritis. Such cases are usually regarded as due to a developing secondary chronic nephritis and the patient is condemned to the irksome routine of nephritic therapy. While

it is quite true that many cases of progressive chronic nephritis have their origin in an acute phase it should be recognized that not all persistent albuminurias following acute nephritis are of this nature. In some instances a harmless residual albuminuria, having its origin in acute infective nephritis, may last for many months without any cardiovascular changes, with perfect renal elimination and with unimpaired good health. It is not surprising that mistakes in diagnosing this form of albuminuria are so frequent, for, unless the case has been under observation for considerable time, or a clear history of the antecedent acute inflammatory attack is forthcoming, the observer has no means of knowing that the symptom has been present for some time. This form of symptomless albuminuria is most frequently discovered at examination for life insurance, and there is liability to serious error unless the examiner is acute enough to be struck by the solitary character of the symptom. The paradox of albuminuria, without cardiac enlargement or disturbances of blood-pressure and with a urine normal in its general characters, should arrest attention and inspire investigation of the case which will generally disclose its innocent character.

4. *Chronic Non-Progressive Nephritic Albuminuria; Illustrative Case.*—C. H., a business man of excellent habits, first came under observation fifteen years ago at the age of forty. The cause of his seeking my advice was rejected at life insurance examination on account of albumin in his urine. Clinical data recorded at first consultation note an increase in the area of the superficial cardiac dullness, its left border being in the mid-clavicular line, the first heart-tone in the mitral segment being reduplicated. There was slight arteriosclerosis, the sphygmogram showing slight arterial tension. The total urine output for twenty-four hours was 1,500 c.c. with a normal quota of urine solids in every essential. There was one half of one per cent. by centrifuge of albumin and the sediment contained numerous hyaline casts. Under advice, the patient has regulated his personal hygiene and diet on a conservative basis and has exercised much in a systematic way in the open air. He has remained during the fifteen years' interval, since the discovery of his nephritis, in exceptionally good health without a single day's confinement from illness. The last clinical record made four months ago was practically the same as that taken at first consultation. His urine still contains hyaline casts and about one-half per cent. of albumin. His blood-pressure has never been noted above 150 mm.

Examples of non-progressive nephritis in individuals before the age of fifty are not common. Renal albuminuria, due to nephritis occurring in youth and early middle age, will in the vast majority of cases prove progressive, and nearly always warrants a guarded prognosis. Occasionally, a case such as the foregoing comes under observation. The organic condition is a slight chronic nephritis without any acute phase, characterized by persistent but non-progressive albuminuria enduring for

years with slight cardiovascular accompaniments and casts in the urine. Under proper regulation of the diet and hygiene these cases appear to remain stationary for years with good general health and with little if any abridgement of the span of life.

This form of albuminuria is not to be confused with the trace of albumin and casts that are so frequent in the urine of arterio-sclerotic individuals. The latter condition is relatively very common and arises from arterial degeneration affecting the renal vascular circuit as a part of general arterial change. The age of these patients is usually advanced beyond the fifth decennary and they display more or less frank evidences of their senile changes elsewhere in the anatomy. The vascular end organs—retina, myocardium, kidneys—are particularly liable, on account of their structure, to develop nutritive changes, the granular alterations in the kidneys causing qualitative urinary findings. Distinction between the albuminuria due to a mild non-progressive nephritis and arterio-sclerotic renal atrophy is difficult and at times perhaps impossible. Appreciation of the fact, that albuminuria and casts in the urine, due to chronic nephritis in early middle life, may persist practically without change or increase for many years and apparently without great detriment to the patient, is of value principally as pointing the lesson that all chronic nephritis is not necessarily serious and that routine prognosis may often err.

5. *Hypertensive Albuminuria; Illustrative case.*—I was consulted in October, 1906 by a lady, fifty-four years of age, who, since the climacteric four years previous, had been much troubled with vertigo, flushings, palpitation, dyspnea of effort, precordial oppression, occipital pains, back-ache, and the necessity of rising several times each night to void urine. There was slight malleolar edema toward evening. Except for much chronic muscular rheumatism and habitual constipation, the personal history was devoid of interest. Patient's father died of "dropsy" at the age of fifty-eight, and one sister and a niece have diabetes. Chief physical findings on examination were a wiry incompressible pulse and a much hypertrophied heart free from murmurs, with a ringing second aortic heart tone. The systolic blood-pressure was 270 mm. The fundus oculi showed diffuse chorio-retinitis with small hemorrhages. The urine excretion was 1,500 c.c., specific gravity 1.015, urea 40 grm., a plain reaction for albumin and a few hyaline casts, some showing granular markings. This patient has been under continuous observation during the intervening period of four and one-half years. Her blood-pressure has never been observed to fall below 200 mm., and has attained the excessive height of 300 mm. During the past year she has developed a faint systolic bruit but compensation remains good, and she has no more edema than was noted at the first examination. Aside from occasional fresh retinal hemorrhages she has developed no complication and has pursued a fairly active life. The last recorded blood-pressure, April

10th, 1911, was 270 mm., pulse 78 and regular. The albuminuria has varied in degree with the blood-pressure, rising and falling in amount with increase and decline of the systolic pressure. The total urine excretion varies from 1,500 c.c. to 2,000 c.c. There has never been any uremic manifestation.

In discussing the albuminuria of arterial hypertension we touch upon one of the most interesting problems of urinary diagnosis. A decade ago such a case as the one just cited would unhesitatingly have been pronounced chronic nephritis. Blood-pressure gauging by means of the clinical sphygmomanometer has brought us to a very different viewpoint in the estimation of such cases. The first fact we have learned is that high blood-pressure and cardiac hypertrophy with albumin and casts in the urine do not necessarily always mean nephritis as once was supposed, but may exist as a distinct syndrome. We have learned the important fact that albuminuria often exists because of high arterial tension: a consequence not necessarily always a cause as formerly interpreted. High blood-pressure may be the primary event occurring quite independently of kidney disease. With hypertension established, the cardiac enlargement and albuminuria follow as consequences. The production of albuminuria is explained as follows: after a certain point in the morbid elevation of the blood pressure is passed—usually about 200 mm.—the permeability of the renal filter is forced and albumin appears in the urine usually accompanied with casts. Whether this is the correct explanation or not, the fact remains that in every case of arterial hypertension the urine becomes albuminous after the tension exceeds a certain point. I have observed this development over and over again in high-tension cases which during an aggravation of the high pressure will display albumin in the urine that subsequently disappears when pressure-values again moderate to the average for the case. Quantitative urine analysis, ophthalmoscopy, and a careful weighing of the clinical evidence must decide the diagnosis in these cases. The physician must take a wide survey of all the attending circumstances and keep the patient under observation before coming to a conclusion. The manner in which albuminuria is brought about in arterial hypertension is antipodal to the production of the so-called vasomotor albuminurias already briefly considered. Persistent non-nephritic arterial hypertension is due to morbid vaso-constriction in the vessels of the splanchnic circulation, probably from sclerosis of the arteries of that circuit. As a result the glomerular blood-current is at so high a pitch of tension as to cause the passage of albumin into the urine. This is the opposite of conditions in orthostatic albuminuria which is associated with morbid vaso-dilation in the splanchnic area, the albuminuria resulting from low tension in the glomerular vessels.

It is surprising that albuminuria, a symptom common to so many diverse conditions, both physiological and pathological, should in the

minds of so many of the profession still retain its ancient erroneous significance as a special sign of Bright's disease. It is inexcusable not to recognize that in a large proportion of cases it is not indicative of serious renal mischief. It is interesting in this connection to note the observations of Hastings and Hoobler (*Amer. Journ. Med. Sciences*, Vol. 83, 1907), who emphasize the discrepancy between the occurrence of albumin and albumin with casts in the urine, and the incidence of nephritis in a series of 5,000 urine analyses. In their series the total number of albuminous urines was 1,014 and the number of urines containing both albumin and casts was 474; whereas the number of cases that could be clinically diagnosed as nephritis was 125.

The greatest difficulty in practice arises in the attempt to distinguish between harmless albuminuria and that dependent on established structural disease of the kidney. Very often, of course, the meaning of an albuminuria is sufficiently obvious. The cases that give rise to perplexity are those in which the albuminuria constitutes the only or almost the only symptom. Various criteria have been suggested to differentiate serious from harmless albuminuria. Among these are the influence of posture, of diet, intermittency, quantity, etc.; but experience has proven that none of these factors can be depended on. Casts formerly so highly valued in the diagnosis of nephritis have been robbed of part at least of their significance. The introduction of the centrifuge has shown that casts may be present when the albuminuria is not of serious moment, as for instance where it occurs following exertion, in concentrated urine, in toxic irritation of the kidneys, etc. This applies not only to hyaline casts, but to the lighter forms of granular casts as well. However suspicious these bodies may be, they cannot alone determine the diagnosis of Bright's disease. On the other hand degenerative casts (coarse, granular, fatty, waxy) affords clear evidence of nephritis. The condition of the cardio-vascular system furnishes us evidence of the greatest value in the differentiation of albuminurias. If the heart and arteries present distinct evidences of morbid alteration, harmless albuminuria can be excluded. Elevation of blood-pressure with albuminuria points with a sure finger to pathological origin.

In cases of albuminuria in which the interpretation seems equivocal, one has no right to pronounce a grave diagnosis unless in addition to the albumin the urine also contains other indications of kidney disease, and cardiovascular signs coexist.

31 North State street.

THE RELATION BETWEEN BLOOD PRESSURE AND BAROMETRIC PRESSURE, ESPECIALLY IN PULMONARY TUBERCULOSIS.

By J. L. POMEROY, A. B., M. D., of Monrovia, Cal.

Since the publication in August, 1908, of L. S. Peters'¹ observation showing that blood pressure was higher in pulmonary cases at an altitude of 6,000 feet than at sea-level, so far as I can find, no verification or refutation of his work has appeared. The problem is an interesting one and deserves careful study. Barometric pressure, commonly included by the profession and the laity when they speak of weather variations in general, has received but little careful study with regard to its influence on blood pressure. In a review of the literature, however, we find a comparatively large field of influence attributed to barometric differences. Among these are uremia (Babcock²), heart disease, with distended right ventricle, pulmonary hemorrhage and various obscure metabolic disturbances. In many of these conditions the conclusions have rested upon general clinical observations without specific attempt to employ laboratory methods. Much of the literature consists in speculative discussion. The value, therefore, of a series of accurate observations on blood pressure is very important. These observations, however, must be interpreted with care.

It must not be concluded that the chief value of the altitude treatment of tuberculosis rests in a certain influence upon blood pressure, unless those observations are sufficient in number and sufficiently controlled to exclude every element of error. The observations of Peters are not in accord with the best of similar records on healthy people, hence a resumé of this work is necessary in order to correctly determine the facts.

It is first necessary to consider the opinions of different writers in regard to the effect of altitude upon blood pressure. Peters states "blood pressure is higher here (Silver City, N. M.) than at lower altitudes or at sea-level." Smith³ at Fort Stanton, 6,200 feet, states "it has been scientifically established that blood pressure is lowered with increased altitude." Smith finds that pulmonary hemorrhage is not more frequent at high altitude than at sea-level, but the results are more often serious and especially in those with impaired circulation. Of 42 autopsies in hemorrhage cases, no less than 17 showed some form of serious cardiac disease. Here, then, may be the connecting link between the effects of barometric change and hemorrhage. Bullock⁴ agrees with Peters that altitude raises blood pressure in tuberculosis.

The bearing of pulmonary hemorrhage upon the problem of altitude and blood pressure is an important one, but it cannot be entered into here as the problem is complex in itself. The general conclusion must be that sudden changes in barometric pressure are responsible in part for blood-spitting. The facts, however, must be studied in regard to humidity, velocity of the wind, temperature and other atmospheric factors. At least one worker in high altitude finds hypotension in pulmonary tuberculosis, but does not give his readings (Bonney⁵). We therefore pass on to the consideration of the results of blood pressure readings in high altitude upon normal people. First, we consider the readings upon normal people who have lived in a high altitude for considerable time, and then we will show the results of a change from high to low altitude upon the blood pressure.

Gardiner and Hoagland⁶ at an altitude of 6,000 feet measured a large number of individuals who have lived in Colorado for over a year, and came to the conclusion that blood pressure was slightly lower than that given as normal for sea-level. They also show that prolonged residence in that altitude does not raise the blood pressure.

Experiments made to show the effect of ascent from 6,000 feet to 14,000 feet gave results which warrant the conclusion that this ascent lowered the pressure and increased the pulse. The fall which took place in this experiment in three and a half hours was not a transient one, for examination of employees who lived for a considerable time at the summit of Pike's Peak showed lower tension than at sea-level. Their conclusions were that the effect of high altitude was to lower blood pressure, that this result was a permanent one and that it was highly probable that the effect on the right side of the heart, the venous system and the capillary blood vessels on the surface of the body was that of dilatation. It might be said here that as the condition of dilatation exists to a considerable extent in pulmonary tuberculosis, one cannot see how a further dilatation would be at all beneficial, if the good results of altitude were to be ascribed to changes in blood pressure.

Sewall's observations⁷ upon the venous pressure, in Denver, show a positive increase at an elevation of one mile as compared with sea-level. Oliver⁸ finds that the venous pressure decidedly increases in going from London to Arosa (5,800 feet).

The conclusions of Schneider and Hedblom⁹ are very clear and emphatic, and their experiments were performed with unquestionable accuracy:—

1. A considerable elevation in altitude tends to lower systolic and diastolic B. P. and to increase the rate of heart-beat.
2. The fall of systolic pressure is slightly greater and more certain to occur than the fall in diastolic pressure.
3. A rise in diastolic pressure occurs in some individuals.
4. The influence of such factors as psychical states, eating and exercise, may obscure the influence of altitude on B. P.

- 5. The fall in B. P. and increase in heart-beat is most marked in the early part of the residence in higher altitude.
- 6. On a prolonged stay in higher altitude the heart-rate probably returns more nearly to the normal than the B. P.
- 7. Higher altitudes do not affect to the same degree the B. P. of all individuals.
- 8. Small elevation in altitude does not appreciably influence the B. P.
- 9. Those individuals most affected by high altitude seem to sustain the greatest fall of systolic B. P. and the greatest acceleration in the rate of heart-beat.
- 10. The heat of the summer season probably accelerates the pulse-rate. The average fall in systolic pressure varies between 0.8 and 21.9 and the diastolic between 0.9 and 11 mm., and the pressure tends to fall as the pulse-rate increases at the high altitude. (See table for review of literature.)

To recapitulate, we have shown that B. P. readings are of importance as relating to altitude from the standpoint of renal adequacy, cardiac action, pulmonary tuberculosis, pulmonary hemorrhage, and from an experimental view—viz., to supply data for associated studies, mountain sickness, metabolic studies and similar research work. It is established that the effect of altitude is to lower blood pressure, especially the systolic in normal individuals, that this occurs soon after reaching an area of low pressure and is not transient, but is shown in old residents. Having established these facts, we will take up the relation which pulmonary tuberculosis bears to them.

Peters' results are at variance with the summary of the observations as given, and it now is necessary to analyze his records. He made observations in 100 cases of pulmonary tuberculosis treated at an altitude of 6,000 feet.

TABLE SHOWING RESULTS OF ALTITUDE EFFECTS ON BLOOD PRESSURE.

Observer and Date.	Barometric reduction	Result on B.P.
Bert, ¹⁰ 1878.....	Pneumatic cabinet	Slight diminution.
Frankel and Geppert, ¹¹ 1883	Pneumatic cabinet	Rise equal to 20 mm.
Lazarus and Schyrmun- ski, ¹² 1883.....	Pneumatic cabinet	Fall of 15 mm. on reducing pressure one-half.
Mosso, ¹³ 1905.....	Pneumatic cabinet	Slight fall.
Liebig, ¹⁴ 1896.....	Pneumatic cabinet	Reduction in 2 cases. Increase in 2 cases.
Dietrick, ¹⁵ Sommerbrandt, Schreiber.	Pneumatic cabinet	Slight increase.
Camus, ¹⁶ 1903.....	Pneumatic cabinet	Lowered.
Cowan, ¹⁷ 1904.....	Pneumatic cabinet	Increase.
Crile, ¹⁸ 1903.....	Pneumatic cabinet	Decrease.
Bartlett, ¹⁹ 1903.....	Pneumatic cabinet	Decrease.
Gorbatschew, ²⁰	Altitude	Increase of about 35 mm hg.

Observer and Date.	Barometric reduction	Result on B.P.	
Mosso, 1898.....	15,000 feet	No change.	
Oliver, ²¹ 1901.....	5,800	Transient increase.	
Gardiner and Hoagland, 1904.	6,000	Lowered.	
	14,000	Lowered.	
Schneider and Hedblom...	1,700 ft.	Decrease both systolic and diastolic.	
	2,000		
	9,000		
	14,109		
Lortet, Friedlander and	3,000 m.	Lowered.	See Huggard's Handbook
Herter, ²²	Altitude	Raised.	
Conway, 1894.....	Altitude	Lowered.	
Kronecker, 1903.....	Altitude	Lowered.	

We wish to state first that unquestionably his readings are high, a comparison between his averages and normal values at the same altitude showing that they are higher than normal individuals. We wish to point out also some apparent inconsistencies in his paper:—14 cases, which were apparently cured, showed on admission a pressure of 114 mm., on discharge 127 mm., a gain of 13 mm. The pressure of 51 third-stage cases showed 124 mm. Hg., only 3 mm. lower than his apparent cures at discharge. These cases show also a difference of 1 mm. from second-stage cases (26 cases=126) and 1 mm. lower than 23 first-stage cases.

PETERS' CASES—COMPARISON OF GENERAL TABLE.

<i>Apparent Cures.</i>	<i>Third Stage.</i>	<i>First Stage.</i>	<i>Second Stage.</i>
Number cases, 14.....	51	23	26
B. P. on admission, 114.....	Average B. P. 124*	128.2	125.7
B. P. discharge, 127*.....	(42 male 127) (9 female 119.1)		

Average increase, 13.

*c.f.

Analysis of these 14 cases shows that of the first-stage, 9 were apparently cured. These 9 on admission showed a B. P. of 116 mm. Hg. (whereas in his general table of 23 first-stage cases, the average pressure was 128.2; male 127.3; female 129.1). On discharge the average pressure was 128 mm. Hg. Again, of these 9 cases, 2 gained nothing, remaining stationary. One gained 1 mm., one gained 2 mm., one gained 8 mm., the remaining four gained 100 mm., averaging 25 mm., and thus raising the averages for the others. This shows that one cannot draw any conclusions from small groups of cases, as the individual variation plays too great a factor. The remaining five in the group gained only 11 mm., thus making an average gain for them of a little over 2 mm. Hence, out of 14 apparent cures supposedly under the influence of a pressure raising force, of the total gains made, five made less than 3 mm. and four made phenomenal gains,—each about 25 mm. Even then the average for 9 cures is only 3 mm. higher than that for the third-stage cases, only 1 mm. from the first-stage cases, and only 2 mm. from the second-

stage cases. According to this, apparent cures may show the same B. P. as third-stage cases, in fact differ but little from the averages of second, third and first-stage cases. Of the cures made from the second and third groups, the pressure on discharge showed lower values than his averages for first-stage cases. It is difficult to comment on these results, for either our classification is entirely inadequate, or one should not attempt to interpret blood pressure readings on the basis of classification at all.

ANALYSIS OF PETERS' TABLES.

Improved Cases.

No. of Stage Cases					
I.	3	Average on admission	124 mm.—discharge 131—gain 7 mm. Hg.		
II.	11	Average on admission	110 mm.—discharge 129—gain 19 mm. Hg.		
III.	18	Average on admission	114 mm.—discharge 126—gain 12 mm. Hg.		

In the second-stage cases one gained 34 mm., one 30 and two 22. Four cases gained 108 mm. If we eliminate these cases from the table as being abnormal values (the case making the largest gain had a pressure of 96 on admission and 130 on discharge), the average is 119 on admission, 126 on discharge=gain 7 mm. instead of 19.

The third-stage cases show also abnormal value, 32-34-42 mm. (98-140, case 64) a gain of 108 mm. for 3 cases. Again, if we eliminate these 3 cases, Nos. 42-64 and 100—we find 15 cases averaging 116 on admission—125 on discharge, a gain of 9 mm.—as against 12.

Arrested Cases.

No. of Stage Cases					
I.	7	Average on admission	125 mm.—discharge 133—gain 8 mm. Hg.		
II.	6	Average on admission	114 mm.—discharge 128—gain 14 mm. Hg.		
III.	17	Average on admission	117 mm.—discharge 132—gain 15 mm. Hg.		

Here again, if we eliminate case 86 (88-112) which shows a gain of 24 mm. we get a reduction to 5 mm. gain, instead of 8. Surely any table to prove scientific data should stand the test of dropping one case without altering the relative values.

In the second-stage cases, case 21 (104-134) shows an unusual gain of 30 mm. and has a marked influence on so small a group. Eliminating it, reduces the gain to 11 mm. instead of 14—as stated.

In the third-stage cases making an arrestment, we have one in particular, case No. 46, 130-172, makes a gain of 42 mm. Besides this we find two gain 20, one 26, two 16 and one 17 and one 18—a total of 8 cases=175 mm., an average gain of about 21 mm.—third-stage cases. The minimum pressure in this gain-making group is 100 (case 74, admission and discharge pressures, 100-126). The average admission rate for these 8 cases is 116 mm. Hg. If, now we eliminate these 8 cases from this group, we find 9 cases with an average admission rate of 119 mm., and discharge at 128, giving 9 mm. as the normal gain.

These revised readings show then:—

Improved Cases.

Stage	No. of Cases	
I.	3	Aver. B. P. on admission 124 mm.—discharge 131—gain 7 mm. Hg.
II.	7	Aver. B. P. on admission 119 mm.—discharge 126—gain 7 mm. Hg.
III.	15	Aver. B. P. on admission 116 mm.—discharge 125—gain 9 mm. Hg.

Arrested Cases.

Stage	No. of Cases	
I.	6	Aver. B. P. on admission 132 mm.—discharge 137—gain 5 mm. Hg.
II.	5	Aver. B. P. on admission 116 mm.—discharge 127—gain 11 mm. Hg.
III.	8	Aver. B. P. on admission 119 mm.—discharge 128—gain 9 mm. Hg.

Comparison of original averages and revised readings:—

Improved Cases.

Stage	Gains Original	Gains Revised Readings
I.....	7.....	7 mm. Hg.
II.....	19.....	7 mm. Hg.
III.....	12.....	9 mm. Hg.

Arrested Cases.

I.....	8.....	5 mm. Hg.
II.....	14.....	11 mm. Hg.
III.....	15.....	9 mm. Hg.

Progressive Cases.

I.	II.	III.
None	105-96	7
		<hr/> 109-105

These cases were far below the average for third-stage values, even on admission, 109—as against 123.5.

Unimproved Cases.

I.	II.	III.	No Cases.
1	4	2	7
<hr/> 128-102	<hr/> 148-150	<hr/> 148-138	

As can be seen, these cases were admitted with high tension, and in the cases of the second and third stage the values are very high, that is suggestive of nephritic conditions. It does not seem possible that cases of pulmonary tuberculosis will run such a pressure without serious complication—thus not due to the toxine of the tubercle bacillus. These values are very high even for normal people. Nothing is given to clear up these questions. Note the high values for third-stage cases.

Having shown some of the discrepancies in Peters' table for admission and discharge cases, we now take up the consideration of the general table. Our own studies were made with Stanton's and Janeway's instruments, using the 12 cm. cuff. All readings were taken in the sitting

position, between the hours of 9 and 11 a. m. We divide our studies in two groups:—One based on the careful work done by Pottenger²³ in investigating the effect of tuberculosis on the heart; the other on an analysis of the cases examined since the publication of his article, and not included in that report. I have taken Peters' general table No. 1 and separated the cases into groups for the purpose of comparison:—Stage I., male and female; Stage II., male and female; and Stage III., male and female. I wish to emphasize the observations of Pottenger calling attention to the palpability of the radial arteries, also the effect of the changes in the heart muscle in its relation to the B. P. These observations accord well with Thayer's²⁴ upon old typhoids,—of 4,000 cases examined at Johns Hopkins Hospital, the highest per cent. of palpable radials were found among cases with a history of heavy labor (57.6 per cent.). Next is alcohol (46.8 per cent.), and among the acute infections rheumatism came first (34.6 per cent.) and typhoid second (26.3 per cent.). Other infections were subordinate. The B. P. was found to be higher in every decade among old typhoids, sclerosis of the aorta was common (52 of 95 cases) and the average heart larger. Statistics on syphilis and gonorrhea were unreliable from the nature of the answers.

Peters' results on 18 cases with previous history of typhoid are not in accord with Thayer's work. The average pressure was 123 mm., which is less than the average for all cases.

Pottenger calls attention very forcibly to the relation of the heart and arteries to the B. P. especially in third stage cases. This is shown here in the Table by comparing the pressure of cases showing myocardial change and those not so complicated. "Further analysis of these cases seems to indicate that these two factors,—thickening of the arterial walls and degeneration of the heart muscle,—are two very potent factors in modifying the blood pressure in tuberculous patients. * * Where myocarditis was not present those patients, who had palpable radials, had a B. P. of systolic 113—diastolic 82, even higher than the pressure of the first and second-stage cases. In those of the same class, whose radials were not palpable, the B. P. was systolic 105, diastolic 83; making a difference of about 8 points in the systolic pressure, which seemed to be due to the condition of the arteries as determined by the radials." He further shows that cases with thickened radials show no increase if associated with myocardial changes. He suggests that this thickening, while helping to raise the B. P. in the early stage of advanced tuberculosis, may prove detrimental later, because of the increased strain put upon the heart. That we must look upon the efficiency of the heart and arteries as being of great importance in explaining the variations in B. P., cannot be gainsaid, since "myocardial change is present in some degree in practically all cases of tuberculosis beginning very early as a hypertrophy of the right ventricle. Later through toxic action the muscle degenerates

and weakens.” Here also we must remember that the contractions and adhesions ever present must cause additional mechanical difficulties in the way of proper functioning by the heart and vessels in the chest cavity. The venous stasis in the abdomen, due partly to deficient diaphragmatic activity, is likewise a potent factor in bringing about cardiac embarrassment. In order to appreciate fully the meaning of blood-pressure records, we must take all these factors into consideration.

TABLE SHOWING COMPARISON OF PETERS' CASES AND OURS AND ILLUSTRATING THE EFFECT OF MYOCARDITIS.

Stage	Sex	No. Cases	Sys. B. P. Peters	Pottenger No Myocard.	Myocard. Present	Admission	Discharge	Gain
I Peters	M	17	127.3					
I A	M	11		112.	none			
I B	M	14				113.	122.	9
I Peters	F	6	129.					
I A	F	8		109.	none			
I B	F	5		110.		110.	115.	5
II Peters	M	20	126.4					
II A	M	8 & 1* 9		110.3 107.5	85.*			
II B	M	27		107.		107.	111.	4
II Peters	F	6	125.7					
II A	F	4		116.				
II B	F	14		107.			121.	14
III Peters	M	42	127.					
III A	M	43			102.			
		33		110.				
III B	M	39		114.		114.	121.	7
III C	M	15			100.		99.	Died in 1 year.
III Peters	F	9	119.1					
III A	F	28			93.			
		24		107.				
III B	F Early III Stage	31		110.		110.	117.	7
		18		109.		109.	117.	8
		10		111.		111.	122.	11
Total cases		433	100	246	87			

The letters A, B, C, refer to series of cases at Pottenger Sanatorium.

On page 13 of Peters' article, he states "the difference in pressure in the three stages is so slight that we believe that the degree of involvement and the blood pressure bear no relation to each other. However, that the B. P. tends to increase with improvement in the pulmonary condition is shown by General Table II." This belief is also expressed by Janeway. It would seem at first thought that this is an anomalous condition—yet it is a fact which only emphasizes the real unsatisfactory

basis upon which our classification rests. The classification at present used cannot possibly express the exact status of the patient, as it is so purely anatomical that for clinical purposes one gets all sorts of apparent contradictions. The classification does not point out clearly the amount of toxemia present. We may, and often do, have a greater toxic state present in a first-stage case than in more advanced conditions, yet I believe with careful scrutiny one can separate the individual factors to one's satisfaction. The confusion is more apparent than real.

From a careful examination of these factors, one may state the following:—

1. The blood pressure bears a direct relation to the toxemia of the tuberculous patient. This toxemia may be greater in the patient who is in a primary anatomically-involved condition, than in a second or third stage. Hence this classification should rest upon the basis of toxemic state. One should eliminate from the first stage, considering the term broadly, all cases showing marked toxemia. Whether we can do so on the basis of the presence or absence of fever is questionable. By properly eliminating our cases in this way, one can intelligently interpret our results.

2. Again, one must group these cases according to the condition of the heart, whether myocardial changes have taken place, whether there is presence or absence of displacements, enlargements or atrophy, and mechanical effects due to pericardial or pleural adhesions, viz., apical around the subclavian artery, etc.

3. One must again separate those cases showing the influence of previous states, especially certain diseases causing arterial changes—syphilis, rheumatism, typhoid fever, etc. Also other influences having no connection with the tuberculous condition—occupation, nervous condition, psychic disorders, nephritis and similar factors.

4. The pathological states peculiar to the individual also require consideration—emphysema, enlarged bronchial glands, and other mediastinal conditions. Comparison of the two sides may reveal differences, which must be averaged. The presence of cervical rib (2 cases), and other unusual factors must be looked for.

It is thus readily seen that if one attempts to estimate blood pressure under the classification usually adopted, it can only lead to confusion. On the other hand, by a study of individual cases, and placing them in similar groups, it is then possible to make comparisons and gain useful facts.

Peters states "our results may be partly due to the stimulating effect of the dry mountain air, which increases the blood pressure, through building up of the general circulation. The results of blood-pressure observations in our cases, far from being indicative of tuberculosis, would signify almost perfect health; in fact, as a diagnostic sign blood pressure plays a minor rôle." There is no question that Peters' readings do compare very well with healthy individuals; but is this as it should be?

The results of the physiological experiments show that his readings are actually higher than in normal people at the same altitude. No matter how slight the lesion may be, in pure pulmonary tuberculosis, one cannot, from my experience, expect to find any influence upon the blood pressure than depression; and barring other influences this depression occurs at the very earliest. From the data which has been brought out, Peters' comparison to the normal cannot but be overdrawn. Experimental results with tuberculin show depression of the B. P. in most minute dosage. If variations take place they cannot certainly be taken as in any way controverting the rule.

CONCLUSIONS.

1. The results of nearly all experimental data show that the effect of diminished barometric pressure upon the human organism is to lower the blood pressure. This result is not transient, but permanent. While the pressure may rise slightly it does not reach its former level.

2. Whatever results to the contrary may have been obtained in pulmonary tuberculosis, must be ascribed to insufficient care in technique, to wrong methods of averaging readings; therefore such results cannot be taken in any conclusive way.

3. There is evidence to show that hemorrhage cases, especially those of fatal tendencies, occur most frequently in patients with cardiac and arterial disease, and that these cases are more fatal in higher than in lower altitudes.

4. There is no reason to believe that patients make any greater gains in B. P. in higher than lower altitudes.

5. Changes in barometric pressure, especially when sudden, bear a direct relationship to pulmonary hemorrhage, and probably may be explained upon the basis of a sudden increase in intrapulmonary blood pressure.

6. The study of B. P. in pulmonary tuberculosis on the basis of the National classification,—I., II., and III. Stages—leads to incorrect conclusions, and is eminently unsatisfactory. It is only by careful individual analysis, regardless of classification that one can properly interpret blood-pressure readings.

7. Especially desirable is it to study the condition of the heart and arteries in pulmonary tuberculosis, particularly from the standpoint of prognosis.

8. It is important to take the B. P. in both arms and average the results, since there exists slight differences in the two sides, due partly to left- or right-handedness, and partly to apical adhesions about the large vessels.

9. The chief influence of higher altitude upon the metabolism shows itself in chemical changes in the tissue fluids, and there is no evidence to show that there is any specific influence causing higher B. P. in the periphery. From a theoretical standpoint such a condition would not

only be undesirable, but would very likely lead to serious damage to the pulmonary circulation.

10. The study of B. P. in pulmonary tuberculosis deserves further attention, because of the great importance of the heart and arteries in this disease.

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A PRELIMINARY COMMUNICATION CONCERNING A NEW DIAGNOSTIC NERVOUS SIGN.

By CHARLES GILBERT CHADDOCK, M. D., of St. Louis.

In order to justify such an assumption as my title indicates, it is necessary to show that what I call a new sign has not been described to my knowledge; that it is an independent manifestation, elicited in a definite way, and capable of affording diagnostic evidence of importance; that it does not occur in health or in a haphazard fashion in disease; that for practical purposes it does not require a technique too complicated for routine application; and that its manifestation is clear enough for reliable interpretation.

Such a sign I think I have found in extension of one or more, or all, of the toes, with or without fanning of them, when the external infra-malleolar skin area is irritated, in cases of organic disease of the spino-cortical reflex paths. I shall call it the external malleolar sign.

Some months ago, in making examinations of patients, I was struck by the ready occurrence of the Babinski phenomenon when the same form of irritation that had elicited it from the sole, was applied just beneath the external malleolus, while no response could be obtained from other skin areas of the lower extremity. In cases where irritation of almost any area of skin over the lower extremity and lower abdomen called forth extensor toe-response, the external infra-malleolar area did not distinguish itself in any way.

Impressed by the ready external malleolar response, I became accustomed to begin examinations of the skin reflexes by irritation of the external infra-malleolar area. I thought I could always foretell thus what response would come from the sole; *i. e.*, with any response in the sense of extension of one or more, or all, of the toes, or with fanning of them, I predicted a Babinski from the sole; with no malleolar response, I predicted normal plantar flexion. Very soon, however, I found I could not predict; that what I was expecting failed to occur. I noted the following variations between the relations of external malleolar non-response and response: (1) in one case of left-sided cranial fracture with no external malleolar response, there was for some days *complete abolition* of the right skin reflexes with final return of normal plantar; never any malleolar response; (2) in a number of cases in which I obtained a response from the external malleolus, I obtained normal response from the sole; (3) in a few cases after persistence of external malleolar response and normal plantar response, plantar response

became abnormal for a time, then disappeared, leaving external malleolar response, which finally disappeared; (4) in other cases with initial plantar and external malleolar response alike of extension, plantar abnormal response changed to normal plantar response, leaving malleolar response persistent; (5) in many cases in which plantar response was mixed; *i. e.*, showing flexion and extension and varying strikingly with place or intensity of irritation and with voluntary jerks, external malleolar response removed any doubt of the nature of the plantar response; (6) in several cases of articular deformity limiting movements of the toes, the absence or presence of external malleolar response was decisive for diagnosis.

In no case presenting frank toe-phenomenon from the sole have I ever failed to elicit the external malleolar sign*; in several cases presenting no Babinski and many presenting doubtful Babinski, I have found the external malleolar sign reliable as indicative of central lesion proved by operation to exist, with its disappearance after operation. I have seen it develop alone, to be joined by a Babinski, and persist after Babinski had changed to normal; I have failed to find it once in a case of abolition of all skin reflexes from cerebral lesion without Babinski; I have never seen it in a normal individual.

I have found it alone (without Babinski) in general paralysis, in skull fracture, transitory unilateral brain lesions, in old hemiplegias, and in undetermined brain lesions, single and double. I have found it in cord lesions. Never have I found it in peripheral lesions or in unmixed tabes. I am now studying the matter particularly in paretic dementia and infants, and adding to my observations of the phenomenon in normal and abnormal cases daily.

The cases, of which I have histories, that are the basis of my observations now number 245. Among these are normal cases, alcoholics, epileptics, tabetics, paretics, hemiplegics (single and double), myelitics, neuritics, and a great variety of cases otherwise classifiable; and most important of all, thirty-six cases of skull injury—fracture, gunshot penetration, and trauma capitis; and among the skull cases there are twenty-two fractures actually demonstrated, eighteen recent, four old; of the fourteen cases classified as trauma capitis merely, some probably were cases of skull fracture.

It is not my purpose to cite cases here in all detail, but to indicate, if possible, the grounds of my assumption and thus make the subject of sufficient interest to incite you to examine the matter yourselves, with a view to prove or invalidate my claim.

*My colleague, Dr. Sidney I. Schwab, has noted one case in which the Babinski phenomenon was present without the external malleolar sign; I have seen one instance of double Babinski in a case of probably paretic seizure (convulsive) ending in death (no autopsy), in which there was no external malleolar sign and no other sign of increased spinal reflectivity.

Case I.*—Mary B., aged six years. (Service of Dr. Rassieur.) Slight fall; grew unconscious during night several hours after injury. Seen next day at 10 a. m.; very small lump above left ear; somnolent, but waking and protruding tongue when asked to do so; signs of slight paresis of right side. Deep reflexes normal; extension and fan of toes on right side from right external malleolus; normal flexion of right toes from sole, but Babinski can be occasionally noted from sole. Babinski on right side was overlooked or not interpreted by good observers. Left external malleolar sign with flexion of toes from sole. Diagnosis: increased intracranial pressure from hemorrhage, probably on left side. Operation revealed large extra dural hemorrhage on left side. Abnormal pressure signs all disappeared within a few hours after operation; recovery. Fracture was not found under hematoma, but only when skull was denuded for decompression.

Case II.—Edward H., aged ten years. (Service of Dr. Blair.) Fall from tree; entirely conscious, never unconscious; no sign of skull trauma whatever. Slight weakness of entire left side. Complaint of headache. Reflexes: superficial; right side: nothing from external malleolus; normal flexion from sole; left side: extension of toes from sole and from external malleolus and from external malleolus to ethyl chloride spray; but no reaction to ethyl chloride from left sole. Subtemporal decompression done on right side; great pressure found but no hemorrhage. Regained power immediately on left side, then lost it, then slowly regained it. Reflexes remained the same as before operation except that normal plantar flexion returned on left side leaving left external malleolar sign at the time of his discharge.

Case III.—W., male, colored, aged seventeen. (Service of Dr. Babler.) Trauma capitis, May 23rd, 1911. Unconscious a few minutes after blow, pain in head. Left side, a large hematoma. Incision revealed no fracture; pulse slow and so continued 44 to 68. No paralysis; *no disturbance of reflexes*; mind clear. Lumbar puncture gave bloody fluid. May 25th, 26th, 27th and 29th, external malleolar sign on right side with normal plantar on right side. All other reflexes normal. External malleolar disappeared. Recovery.

Case IV.—Tom W., aged thirty-six years. (Service of Dr. Blair.) Severe skull fracture eighteen months ago; no operation. Mentally dull since. Deformity of forehead from healed fracture. Suspicion of general paralysis; Wassermann negative; lymphocytosis of spinal fluid; Argyll-Robertson pupil; history of a chancre. All deep reflexes very lively; no clonus. Normal plantar flexion on both sides; external malleolar sign perfectly developed on left side.

Case V.—Congenital imbecile, male, adult. Apparently normal physically. All deep reflexes absent in legs. Double external malleolar sign perfect; normal plantar flexion. (Observation service.)

Case VI.—T., aged fifty-six years. (Service of Dr. Schwab.) Right hemiplegia. with all classic signs. After several weeks began to walk, having normal right plantar flexion, but malleolar sign remained on right side.

Case VII.—Clayton G., emergency. (Service of Dr. Babler, May 8th, 1911.) Depressed fracture of left upper parietal region. Never unconscious. Craniotomy by Dr. Babler. Neurological examination May 9th. Normal reflexes both sides, no reaction from external malleoli. The feet are peculiar in that there is a general contracted position of all toes so that they are drawn upward and tips curled under. Irritation of soles causes slight upward movement of toes. The absence of external malleolar sign removes all doubt, and did so in emergency room before operation. Discharged recovered.

Case VIII.—George E., emergency case, 10 p. m., May 20th, 1911. (Reported by my interne, Dr. Deppe.) Hematoma over left occipito-parietal region. In-

*All cases here cited are from the records of the St. Louis City Hospital.

cision and operation showed extra dural clot; removed; stertor; pupils dilated and fixed; abdominal and cremastic reflexes absent; knee-jerks absent; ankle-jerks not tested. Babinski on right side, also right external malleolar. External malleolar on left side. Just before operation Babinski found—had developed on left side. Death.

Case IX.—William K., adult. (Service of Dr. Blair, May 5th, 1911.) Received with history of head injury. Incision right hematoma revealed no fracture. Seen at 10 a. m. Semiconscious, restless, no paralysis. Face smoother on left side than right. All reflexes normal, including pupillary reactions, but skin reflexes show following peculiarities: irritation of left sole causes flexion of toes. Under repeated examination there was occasional extensor movements from left sole. Extension of toes marked from scratching under left external malleolus and from ethyl chloride spray,—nothing from sole to ethyl chloride spray. Diagnosis of Babinski had been made by Dr. Hagler in presence of plantar flexion. Right side normal reaction from sole, nothing from malleolus. Right subtemporal decompression done; massive hemorrhage with brain laceration found. Patient has recovered but shows mental disturbance. Reflexes from sole normal—no malleolar.

Case X.—No. 931. Unknown male, aged thirty-five years. (Service of Dr. Max Myer, May 8th and 9th.) Alcoholic. History of having been in a fight, going home and of coming in a second time unconscious, after having had stomach washed out in emergency room at first visit. Head shaved—no hematoma found. Black eye developed on right side during morning of May 9th. Seen at 10 a. m. Semiconscious, restless, no real paralysis, but left side weaker than right; pupils wide, inactive, conjugate deviation to right. All reflexes, deep and superficial, with the following exceptions, normal: repeated examination by Dr. Hagler had revealed no Babinski. I found the external malleolar sign present on the left side with normal plantar flexion, and also the external malleolar sign excited by ethyl chloride spray. Examined at ten, eleven, twelve, twelve-thirty, and one o'clock, found the same anomaly and demonstrated it to several medical men. In the afternoon four lumbar punctures were made; no blood found, but fluid reported turbid. Patient clearing mentally. May 10th, patient mentally clear. Denies lues; gives history of blow on right side of head eight years ago with resultant weakness of left arm. Pupils now equal and reacting normally, but left consensual is more active than right. Plantars normal on right; on left occasional Babinski from sole, always external malleolar sign.

May 11th, no left Babinski—normal flexion—no external malleolar sign. There was clear evidence of weakness of left arm. Patient gave history of severe similar attacks due to even mild drinking. Diagnosis: pachymeningitis, chronic; cerebral symptoms aggravated by congestion and edema—actually relieved by rachicentesis. Recovered from acute condition.

Case XI.—Mike K., thirty-three years. (Service of Dr. Blair.) No history. Received unconscious. Three hours or so without Babinski, then found on left side. Operation low temporal decompression on right side finding large extra dural clot. Wound closed; dura not opened. Next morning, at Dr. Blair's request, examined patient. Patient had not improved. Found no actual paralysis; moved left side less than right. Toes on both sides seen in attitude of extension. On left side extension of toes easily induced from sole and from external malleolus. On the right side, nature of reaction less clear because foot is jerked away, but ethyl chloride spray removes all doubt, causing perfect Babinski on both sides and giving the external malleolar sign on both sides. Dura was opened in old wound and copious hemorrhage found. Patient died next morning from pulmonary edema.

Case XII.—John F., thirty-one years. Alcoholism. Syphilis twelve years ago. Right malleolar sign most perfectly developed; fanning of little toe on left side; perfect plantar flexion on both sides. All deep reflexes very lively. Pupils unequal, left pupil fixed. No reflectivity from indifferent areas. Superficial reflexes otherwise normal. Diagnosis: cerebral syphilis. No actual sign of general paralysis. No reaction to ethyl chloride spray.

These and many other cases have proved to my satisfaction that irritation of the external infra-malleolar area causes no reaction normally; that the external malleolar sign is usually present when Babinski is present; that it is often present when Babinski is absent; that it may come before, accompany a Babinski, and outlast it; that its presence or absence is a great clinical aid in the interpretation of doubtful or occasional abnormal movements excited from the sole; that it signifies disorder of an organic nature in the spino-cortical reflex paths.

I have used the same kind of irritation to induce the external malleolar sign that is used customarily to elicit Babinski's sign.* But I would explain some foregoing allusions to ethyl chloride spray as an excitant. I began its use in searching for the possible reaction to cold in abnormal cases, and I found in many cases, not all, that abnormal reaction was induced with astonishing ease. In some doubtful cases, it made matters clear at once. I have found it of value in localizing the level of involvement in cord lesions—but that is another story. I had tried ice before successfully in searching for Babinski's sign, and in using ethyl chloride I was simply trying the effect of cold with the element of material stimulation reduced to a minimum. Normally, we rarely, if ever, get any reflex reaction to an ethyl chloride spray. And permit me to suggest that ethyl chloride spray might be used to facilitate the difficult examination of the temperature-sense, eliminating thus the sense of touch as far as possible.**

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*The degree of irritation (I use a moderately pointed nail-file) should be varied. In some cases the merest touch is sufficient to excite the sign; in others, rather severe scratching may be required. Usually the most sensitive point is a slight depression just in front of the lower point of the external malleolus and behind the tuberosity of the cuboid, but sometimes the movement occurs more readily when the posterior groove is scratched.

**Subsequent observations, incorporated in a paper read before the Society of the St. Louis City Hospital Alumni, show that even plantar flexion of the toes excited from the external malleolus is as significant as extension or fanning of them; that in cases of unilateral capsular lesions, the external malleolar sign occurs often on both sides—on the paralyzed side with Babinski, on the unparalyzed side without Babinski (homologous motor fibres). It has been found pure and unilaterally in two cases of cerebrospinal meningitis (epidemic), and in a case of tuberculous cerebrospinal meningitis. It has been found in one case (no nervous lesion apparent) from the ankle where the foot had been dislocated forward creating an arthritis—which suggests some possible relation between this sign and arthritic ankle clonus.

TUBERCULIN THERAPY IN CLINIC AND OFFICE PRACTICE.

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In the beginning of March, 1910, at the Presbyterian Hospital Tuberculosis Clinic, and for a few patients in private practice, a trial was made in the administration of tuberculin to ambulant patients. This was done at first with some misgiving, and doubt as to the results to be achieved in this class of patients, for until the past few years it had generally been considered best to limit specific treatment to cases in sanatoria where they could be under constant supervision. The cases here reported have not been selected as especially favorable, but largely on account of their willingness to continue treatment regularly and faithfully for a period of at least three months, as results cannot be expected within a shorter time. The patient must also be trained to keep an accurate chart of his temperature at four hour-intervals. A record of the pulse is made at the same time, and he is instructed to note carefully any symptoms of malaise, pains in the back or limbs, headache, nausea or vomiting, increased cough, dyspnea, prostration, or any change in the subjective condition following the injections. The majority of cases here reported have been late incipient or second stage patients who have had dietetic and hygienic treatment under favorable conditions at sanatoria or the day camp. They had been under observation for a year and a half or two years and their condition was stationary, or they were losing ground. It is evident that such cases offer a severer test of the tuberculin treatment than cases appearing for treatment for the first time, that coincidentally with the specific treatment are placed on the ordinary fresh air and dietetic methods. Many cases of incipient pulmonary tuberculosis do extremely well with hygienic and dietetic measures alone. When, however, these measures have been tried for many months and with little permanent result, the conclusion appears to be irresistible when the tuberculin treatment is added, that such improvement as results may be fairly ascribed to the influence of the tuberculin and the tuberculin alone.

In every case here reported Koch's old tuberculin has been employed. There are many varieties of tuberculin, but it has been felt that more has been known and published regarding Koch's original preparation. There is an ample literature concerning it, it has been longer in use, and it is believed that all varieties owe whatever efficiency they may possess to

the substances contained in Koch's original glycerine filtrate. In no case has it seemed necessary to begin with a lower dosage than 1/20 mgrm., nor has it been necessary in order to obtain results which have often surpassed anticipation to push the tuberculin to the large maximum doses advised by some writers. In no case in this series has the patient received more than 15½ mgrm. But one general reaction has been observed and that was slight and transient, and apparently not productive of any harm to the patient. The injections have been given with the usual antiseptic precautions in the areolar tissue above the spine of the scapula, alternating from shoulder to shoulder. There have been no abscesses and very little local discomfort.

Case I.—Jennie M., *aet.* seventeen. Came under treatment May 1st, 1908. Mother, two maternal aunts, and a maternal uncle died of consumption. Another uncle has pulmonary tuberculosis. Typhoid fever seven years ago. Winter cough for several years. Purulent sputa, hemoptysis at times, chills and fever, profuse night sweats, loss of flesh and strength, dyspnea on exertion, poor appetite. Amenorrhea for two months.

On physical examination, pale, ill-nourished, stoop-shouldered. Marked dullness over both upper lobes, breath-sounds rather diminished. Temperature 99.4° F., pulse 100, respiration 22. Weight 103½ pounds. Von Pirquet tuberculin-test negative. No tubercle bacilli in the sputum. She was placed on dietetic and hygienic treatment and was admitted to the Middletown day camp. On October 9th, râles over the right apex. Temperature 100.8° F., weight 112 pounds. December 11th, rather profuse hemoptysis. She has marked atrophic rhinitis. On February 26th, 1909, she was admitted to the Adirondack Cottage Sanatorium where it was stated that tubercle bacilli were detected in the sputum. She returned September 27th considerably improved. The râles had disappeared, she had gained a little in flesh and strength. Temperature 100° F., weight 113½ pounds.

She had considerable hemoptysis and one rather profuse hemorrhage while at the sanatorium. During the month of October she did rather poorly. Her temperature ranged from 101° to 102° F. She had severe chest pains, felt much prostrated and was kept in bed for several weeks. January 31st, 1909: She has a poor appetite, frequent chills, and profuse night sweats. Tubercle bacilli absent from the sputum. On March 9th, tuberculin treatment was instituted, beginning with an initial injection of 1/10 mgrm. Temperature, 99.6° F., pulse 104, weight 111½ pounds. The tuberculin treatment was continued in gradually increasing doses up to June 27th, when she was much improved and went to the country. She had 31 injections in all, the last and maximum dose 5 3/5 mgrm. Her cough and hemoptysis practically disappeared. She was seen again on November 25th, when she stated that she had had no cough since last August. No expectoration or active pulmonary signs.

Moderate dullness over right upper lobe, percussion note high pitched over the left. Temperature 98.6° F. Under date of December 28th, her improvement has been maintained, she has a good color and she feels very well. She has no cough or expectoration. Temperature 98.4° F., weight 113 pounds.

Case II.—Amelia M., *aet.* twenty-two, a dress-maker. Family history negative as to tuberculosis. She had measles as a child, no important illness since. She first came under observation June 12th, 1908, with a history of cough of six months duration, purulent sputa, hemoptysis, loss of flesh and strength, fever afternoons, night sweats for three months, pains in the chest; fair appetite, but poor digestion, menstrual function regular.

On physical examination, pale, poorly nourished, marked dullness and bronchial breathing, whispering bronchophony over both upper lobes; over the left behind, pleuritic friction sounds. Temperature 101° F., pulse 126, respiration 22. Weight 87½ lbs. Six months previously she weighed 100 lbs. Tubercle bacilli present in the sputum. She was put on dietetic and hygienic treatment and improved considerably as regards cough, expectoration and temperature. On December 8th, 1909, her general condition however was not very satisfactory. Temperature 98.4° F., weight 99 lbs. She was not at all strong, and tuberculin injections beginning with 1/10 mgrm. were begun March 9th, 1910, were continued twice a week, and increased up to 9 1/5 mgrm. as a maximum dose. She had 66 injections in all. Tubercle bacilli disappeared from the sputum. November 15th, 1910, on physical examination there were dullness and bronchial breathing over both upper lobes, more marked over the right. No cough or expectoration, and she feels much stronger. Temperature 98° F., pulse 72, weight 105. Under date of December 30th, her marked improvement has continued and she considers herself well.

Case III.—Louise M., *aet.* nineteen, cigarette packer. A maternal aunt died of tuberculosis of the lungs. A brother has recently become tuberculous and is at the Otisville Sanatorium. She came under treatment on February 10th, 1908, with a history of cough for a year, purulent sputa, occasional hemoptysis, loss of flesh and strength, fever afternoons, pains in the right chest, appetite and digestion fair; menstruation regular. On physical examination, she is slight and poorly nourished; dullness, bronchial breathing, whispering bronchophony, fine râles over both upper and right middle lobes. Temperature 99.6° F., pulse 86, respiration 24, weight 95 lbs. Tubercle bacilli present in the sputum. Von Pirquet tuberculin-test positive. She was put on hygienic and dietetic treatment and attended regularly the day camp at Middletown. In June, 1909, she was in bed for two weeks with a severe hemorrhage. Temperature ranged between 98° and 100° F. In July she was admitted to the Otisville Sanatorium, but remained only a few days. January 7th,

1910, tubercle bacilli were still present in the sputum; she weighed 97½ lbs. She had frequent hemorrhages and was rapidly losing ground. On March 9th, tuberculin treatment was instituted beginning with an initial dose of 1/10 mgrm. which was continued twice a week with continually increased doses up to a maximum of 12 mgrm. She had 82 injections in all up to January 6th, 1911. She has gradually improved in strength, tubercle bacilli have been absent from the sputum since June 7th. Temperature normal since July 23rd. Her râles have entirely disappeared, and she has no cough or expectoration. She is feeling very well and contrary to advice was married during the summer. At no time during her treatment did she have anything approaching a general reaction. She had one stitch reaction. Under date of January 30th, 1911, her improvement has been maintained. Temperature 98.8° F., pulse 80, respiration 20, weight 98 lbs., which is equal to her best weight before she was ill.

Case IV.—Anna A., *aet.* nineteen; family history negative as to tuberculosis. She came under treatment March 26th, 1909, with a history of cough for five years, muco-purulent sputa, no hemoptysis, considerable loss of flesh and strength, chills, fever afternoons, pain in chest; appetite and digestion good, menstruation regular.

On physical examination, she was fairly well nourished, dullness, increased breathing and whisper over the right upper lobe; impaired resonance over the left apex. Cervical glands are considerably enlarged. Temperature 100° F., pulse 98, respiration 24, weight 114 lbs. No tubercle bacilli detected in the sputum. She was placed on dietetic and hygienic treatment, and on March 21st, her weight had increased to 130½ lbs., with a considerable improvement in her symptoms and general condition, but her temperature ranged between 99.4° to 100° F., May 15th; she had been hoarse for two months. Throat examination showed her vocal cords slightly reddened, no infiltration or suspicion of tuberculous involvement. Has not been doing as well, has lost some weight and has continued to run an afternoon temperature. Weight 129 lbs. On June 3rd she was placed on tuberculin treatment receiving an initial injection of 1/10 mgrm., which has been increased to 4 3/5 mgrm.; had two injections a week, 41 in all. On November 14th, no tubercle bacilli present in the sputum. November 26th, temperature, 98.8° F., weight 141 lbs. Cervical glands have diminished in size. Her cough is slight and she feels much better.

Case V.—Tillie Z., *aet.* nineteen, has been under treatment since October 16th, 1908. No tuberculous family history. Cough for a year, muco-purulent sputa, no hemoptysis, marked loss of flesh and strength, fever afternoons, occasional pain in chest, appetite and digestion poor, has missed one menstruation period.

On physical examination, she is fairly well nourished, her chest is retracted above and below the right clavicle, slight dullness, increased

fremitus, harsh breathing and a few inconstant clicks over the right upper lobe. Temperature 100.2° F., pulse 86, weight $98\frac{1}{2}$ lbs.; before she was ill, 110 lbs. No tubercle bacilli in the sputum. She was put on dietetic and hygienic treatment and attended the Middletown day camp. November 18th her weight had increased to 105 lbs. March 10th, 1909, she had a slight hemoptysis. August 19th was admitted to the Otisville Sanatorium where she remained for six months. She returned March 7th, 1910. No tubercle bacilli present in the sputum. Temperature 98.2° F., pulse 122, weight $111\frac{1}{2}$ lbs. April 13th, dullness, prolonged expiration over right upper lobe and left apex; numerous râles posteriorly; her cough is worse and her sputum is frequently blood-streaked. June 14th, temperature 99.2° F., pulse 104, weight $108\frac{1}{2}$ lbs. Her general condition is not so good. Tuberculin was given with an initial dose of $\frac{1}{10}$ mgrm. continued twice a week and increased to 4 mgrm. September 9th, weight 110 lbs. She has had 56 injections in all. Her cough persists and the expectoration is at times streaked. Moderate dullness over the right upper lobe. There are no râles. Her signs are all less marked, her temperature is normal, but she has recently lost some weight.

Case VI.—Mary F., *aet.* five; family history negative as to tuberculosis. She was a bottle-fed child. Diphtheria at three years; measles at the age of four. She has had enlarged corvical glands since the age of three, and has coughed since she was nine months old, when she had a severe attack of pneumonia. After a "cold" last November, the glands below the clavicle were much swollen. One suppurated and required incision, and has discharged more or less ever since. Other glands have also increased in size.

She came under treatment March 22nd, 1910. She has lost flesh and strength, fever afternoons. Her appetite is good and bowels regular, weight 48 lbs. On physical examination, she is a pale, poorly-nourished child. Marked dullness, harsh bronchial breathing over both upper lobes. Numerous enlarged glands especially in the left side of the neck where there are three red, fluctuating areas below the angle of the jaw, the uppermost showing a badly-healed cicatrix of an incision made five months ago and which has continued to discharge a thin curdy pus. No tubercle bacilli present in the sputum. April 7th, von Pirquet tuberculin-test is positive. She was put on dietetic and hygienic treatment and has attended the day camp at Middletown regularly. On May 21st, a cold abscess on the left side of the neck was incised and a dram or more of pus evacuated. A rubber band has been worn constantly about the root of the neck, making a moderate pressure, with two hours intermission in the twenty-four, to try the Bier hyperemic treatment. March 26th, temperature 99.4° F., weight $47\frac{1}{2}$ lbs. Tuberculin treatment was begun with an initial injection of $\frac{1}{5}$ mgrm. April 11th a second injection of $\frac{1}{5}$ mgrm., April 14th, $\frac{1}{2}$ mgrm. The glands are somewhat smaller. Temperature 99.8° F., pulse 100, respiration 24, weight 49 lbs. She had

a considerable general reaction following the last tuberculin injection and on April 18th, the tuberculin was reduced to $1/5$ mgrm. April 28th she had a suspicious looking sore throat with patches on the tonsils. A culture for Klebs-Löffler bacilli was negative. Tuberculin injection was omitted. May 11th, temperature 99° F., pulse 116, respiration 26. She was given another injection $1/5$ mgrm. on May 16th. Temperature 99.8° F. pulse 110; tuberculin $1/5$ mgrm. Following the last two injections she has had a stitch reaction. June 10th, tubercle bacilli not present in the sputum. The tuberculin injections were continued in gradually increased doses twice a week to September 1st, maximum dosage $2\frac{1}{2}$ mgrm. with a marked improvement in her neck and in her general condition. Glands are less swollen and less sensitive. The discharge has wholly ceased. The child seems well and in good spirits. On October 17th, when she was last seen the improvement had been maintained. There is no discharge, the sinuses which formerly existed are replaced by firm healthy cicatrices except at one point which is a trifle soft and tender. Cough is slight. Moderate dullness, increased breathing over both upper lobes, more marked over the right. Temperature $99\frac{1}{2}^{\circ}$ F., pulse 90, weight $48\frac{3}{4}$ lbs.

Case VII.—Catherine C., *aet.* twelve, school girl. Family history negative as to tuberculosis. She has had measles and whooping-cough and an attack of pneumonia when five years old. Came under treatment December 27th, 1909. For three years she has had a winter cough which had been much worse for the past three weeks, muco-purulent sputa, fever afternoons, loss of flesh and strength, pain in the back, night sweats for a week; chills, dyspnea on exertion, appetite and digestion good, bowels regular. On physical examination, she is tall for her age but slight. She has a fair, white skin, flushed cheeks, arched eyebrows, long lashes, large lustrous eyes, and tapering fingers, a good example of the romantic type of tuberculosis. She has a well-marked funnel breast deformity. There are dullness, increased vocal fremitus, exaggerated whisper and breathing over the right upper lobe, and in the left axilla, and below the scapula and area of dullness and moist râles. Temperature 99.6° F., pulse 88, respiration 20, weight 88 lbs. No tubercle bacilli in sputum. December 30th, von Pirquet and Moro tuberculin-tests are negative. She was put on dietetic and hygienic treatment and attended the Middletown day camp. In March she began tuberculin treatment, receiving an initial dose of $1/10$ mgrm. which has been gradually increased up to a maximum dose of $2\frac{3}{5}$ mgrm. Up to January 4th, 1911, she has had 43 in all, temperature, 98° F., pulse 100, weight $108\frac{1}{2}$ lbs. There has been a decided improvement in her condition. Slight signs, dullness and increased breathing persist at the right apex, râles have entirely disappeared. She feels very well. Slight cough in the mornings, no expectoration.

Case VIII.—Joseph V., *aet.* thirty-five, employed in the Park De-

partment. Family history negative as to tuberculosis. Came under treatment March 22nd, 1910. Has had no serious illnesses except his present complaint which began with a cough in August, 1909; scanty purulent sputa. A week ago hemoptysis for the first time, loss of flesh and strength, night sweats, chills, fever, dyspnea on exertion, appetite and digestion are good. On physical examination, he is well nourished and has a good color. Dullness, broncho-vesicular breathing, increased whisper and fine râles over the right apex. Evening temperature 99° F., pulse 102, weight 180½ lbs., a year ago 200 lbs. Tubercle bacilli are present in the sputum. On March 31st, tuberculin treatment was instituted beginning with a dose of 1/10 mgrm. which was continued twice a week, increasing the dose up to 7½ mgrm. He received 23 injections in all up to June 14th, when the treatment was discontinued. There had been a marked improvement in all of his symptoms, râles disappearing, and he gained rapidly in weight. After the injection of June 3rd, he had a headache for two days and a little nausea. He had one stitch reaction. He was not seen during the summer, but on November 23rd his improvement had all been maintained. He has no cough or expectoration; his appetite and digestion are excellent, and he considers himself perfectly well. On physical examination, there is a little residual dullness over the right apex, no other signs. Evening temperature 98.6° F., pulse 100, weight 206 lbs.

An analysis of these cases shows that four, that is fifty per cent., have been apparently cured; one may be conservatively described as an arrested case, and each of the remaining three has been considerably improved. Every case has gained in weight, Case VIII. showing the extraordinary increase of 25½ lbs.; Case IV. 9½ lbs. In three, bacilli have disappeared from the sputum. In one case in which tubercle bacilli were present in the sputum before beginning treatment, no sputum could be obtained for examination after the tuberculin injections were discontinued. The remaining four cases from the beginning were closed cases, no bacilli at any time having been found. In cases in which fever was present, the temperature has uniformly fallen under the tuberculin treatment. Four of the patients treated had frequent hemoptysis or considerable hemorrhages, and this symptom has been favorably influenced under tuberculin, hemoptysis having ceased entirely in three cases where it was present.

In several instances, notably Cases I. and VIII., improvement continued after the cessation of the specific treatment which appeared to give the patient the necessary impetus to recovery and sustained resistance to his disease.

As far as conclusions may be drawn from this series of cases, it would seem that it is not necessary to limit the use of tuberculin to sanatorium and hospital patients, but it may be safely employed for any incipient or moderately advanced case with sufficient intelligence to keep his tem-

perature chart, and enough imbued with a desire to get well to continue his treatment over an adequate period of time. An elevation of temperature of a degree or a degree and a half is not necessarily a contraindication to the tuberculin treatment. With the observance of simple precautions, carefully graduated doses, avoidance of reactions, and a proper selection of cases, there seems to be no good reason why tuberculin should not be much more extensively used in practice. No other method of treatment known will accomplish the results which may confidently be expected from tuberculin in many cases of pulmonary tuberculosis.

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HEAT AFFECTIONS.

By CLEVELAND H. SHUTT, M. D., of St. Louis.

Heat affections are usually serious and require prompt treatment. They are divided into two classes:—Heat exhaustion and heat-stroke (thermic fever or sunstroke). They may be associated with other conditions and especially with suffocation. Firemen frequently suffer from the combined influences of heat and gases.

Heat exhaustion is an asthenic condition characterized by a subnormal temperature, general weakness, and frequently by severe collapse. The initial symptoms are severe headache, changes in vision, and a general feeling of exhaustion.

Heat-stroke is a sthenic condition characterized by prodromal symptoms usually of short duration. They may be headache of an intense type, changes of vision and a general overheated and oppressed feeling. There is always a rise in temperature. The mild forms are known as thermic fever and the severe forms as insolation cases. In insolation cases the patients are semiconscious or unconscious, and their temperature frequently reaches 108° F. and may reach 112° F.

The majority of heat-stroke cases occur during the very warm months, in those directly exposed to the rays of the sun. Cases also occur in those exposed to high temperatures in laundries, boiler-rooms, etc. A hot, moist atmosphere impedes evaporation and is more dangerous than dry heat. Alcoholics are more susceptible to heat affections than temperate persons, and have less chances for recovery.

Horatio C. Wood, who has made exhaustive researches, concludes in regard to the pathological physiology of heat exhaustion and heat-stroke as follows:—"There is in the pons or higher portion of the nervous system a centre, whose function it is to inhibit the production of animal heat, and in the medulla oblongata a centre (probably the vasomotor centre) which regulates the dissipation of bodily heat. Fever is due to a disturbance of these centres so that more heat is produced than normal and proportionally less thrown off. Let it be supposed that a man is placed in such an atmosphere that he is unable to get rid of the heat which he is forming. The temperature of the body will slowly rise, and he may suffer from a general thermic fever. If early or late in this condition the inhibitory centre becomes exhausted by the effort which it is making to control the formation of heat, or becomes paralyzed by the direct action of the excessive temperature already reached, then suddenly all tissues will begin to form heat with the utmost rapidity, the

bodily temperature rises with a bound, and the man drops over with one of the forms of heat-stroke.

"Heat exhaustion, on the other hand, with the lowered temperature represents a vasomotor palsy, *i. e.*, a condition in which the existence of the heat paralyzes the centre in the medulla and the heat is dissipated more rapidly than it is produced."

The explanation for heat exhaustion is considered by authorities as less satisfactory than it is for heat-stroke. The symptoms of heat exhaustion and heat-stroke are widely different. However, first appearances may cause some question as to diagnosis. The thermometer is a valuable aid and its findings usually decide the diagnosis between the two forms of heat affection.

One should fix certain points in diagnosis clearly in mind; otherwise a lack of history, so frequently the case in hospital or dispensary service, may delay diagnosis and treatment. Heat exhaustion presents a feeble, weakened condition or a state of collapse, and a lowered body temperature. The temperature may range from slightly below normal to 94° F. or lower. It usually occurs in old people or in those whose resistance is below normal. Heat-stroke, on the contrary, usually occurs in the active able-bodied, and presents a rise of temperature. Both affections in the severe forms present semiconscious or unconscious conditions.

A feeling of extreme heat and oppression usually precedes a heat-stroke, and unconsciousness may supervene rapidly. Death may occur in a short time. In many cases there is an intense headache, oppression, vertigo and sometimes nausea. The pulse and pupils are not characteristic, varying with the temperature. The skin is usually dry, but some perspiration may be present.

To make a differential diagnosis of cases without history may require some time, but there need be no delay in trying to reduce the temperature. Laboratory and other examinations and observations may be made at the same time. The urine should be examined early, and blood examinations are frequently useful and necessary.

Usually the patients are found in a semiconscious or unconscious condition, and a number of possible conditions must be considered and excluded. Where a history is obtainable, the diagnosis is usually plain. One should be able to make a diagnosis in the more severe or unconscious forms without a history. The following table for the differentiation of unconscious cases, without a history, may be of some advantage.

TREATMENT.

Cases of heat prostration require treatment suitable to an asthenic condition, *i. e.*, conservation and building-up of energy. The patients should be placed in warm beds, and hot stimulating drinks should be given. Articles which retain heat for some time should be wrapped in

DIFFERENTIAL DIAGNOSIS OF UNCONSCIOUS CASES WITHOUT A HISTORY.

	PULSE.	TEMP.	RESP.	NERVOUS SYSTEM	MUSCULAR SYSTEM	CHANGES IN SPECIAL ORGANS, ETC.
Heat Exhaustion	Usually weak and rapid	1½° — 4° F. below normal	Shallow or about normal	Semi or unconscious. Extreme weakness. Asthenia—collapse	Flaccid, quiet	May have changes in vision and headache as initial signs. Cold extremities, skin pale
Heat - stroke (sunstroke, thermic fever, etc. Insolation cases).	Frequent usually full and tense	Above normal. May reach 110° F. or more	Usually active and may be labored	Sthenic condition. Active—usually	Resistive. Tense. Tendency to be active. Strength good	Involuntary defecation occurs frequently. Skin usually dry. May or may not have alcoholic odor
Acute Alcoholism	Usually full and rapid	May be subnormal, normal or increased	Frequently stertorous	Collapse in extreme cases. Can usually be aroused	Usually tense. In severe cases flaccid	Breath odor—general appearance—cyanosis in extreme cases with flaccidity. Stomach contents.
Delirium tremens (severe)	Rapid—variable in strength	Above normal, may be high	Variable	Hallucinations, delusions, etc. Can usually be aroused for a moment	Weak—signs of illness for several days	May or may not have alcoholic odor—usually not. General unkempt appearance and evidence of disease of some duration.
Febrile delirium (typhoid, pneumonia, etc.)	Variable	Always above normal. Bathing will not lower to subnormal	Variable	Variable delirium. Subsultus tendinum tremors, etc. Carphologia	Feebly active. Signs of extended illness	Accumulations around teeth and tongue and eyes. Laboratory examination of body fluid. Skin and other physical findings
Cranial lesions (injuries, etc.)—under 24 hours—injury to base of skull, etc.	Full or shallow. Reg. or irreg. May be much decreased in rapidity, about normal or rapid	May be slightly subnormal, usually more or less above normal	Variable	Semi- or unconscious. Quiet or delirious. Basal injuries usually produce active delirium or deep unconscious condition. Reflex changes	May be relaxed. May have local spasm or paralysis or general activity. Usually the body appears well nourished	Usually have some evidence of local head injury—wound, hematoma, ecchymosis or bleeding from ear, nose or mouth. These findings may be entirely absent. Reflexes very important. Finding of blood in not more than 1-2 c.c. of spinal fluid. Examination of urine, etc. Pupils.

	PULSE	TEMP.	RESP.	NERVOUS SYSTEM	MUSCULAR SYSTEM	CHANGES IN SPECIAL ORGANS, ETC.
Cranial conditions (over 24 hrs.)	Variable	Usually above normal	Variable	Semi- or unconscious. May be delirious or quiet. Reflex changes	May be relaxed or have local spasm or paralysis. Body may show signs of period of illness	Above findings apply. Reflexes very important. Entire body to be examined for injuries in all cases. Pupils
Apoplexy	Usually normal and slow. May be thready and rapid	Frequently normal — may be above and rarely below	Variable frequently stertorous	Semi- or unconscious. Changed reflexes may be quiet or restless	Local spasm or paralysis. General condition usually good	Age of patient and condition of vessels—pupils—may have secondary head injuries. <i>May</i> have odor of alcohol
Uremia	Usually full and tense and rapid	Somewhat above normal	Frequently deep. May find acetone odor on breath	Semi- or unconscious. Sometimes may be aroused	Feebly active or passive. Nutrition usually appears good	Breath odor. Enemas may or may not be present. Examination of urine
Poisoning	Variable	May be subnormal, normal or elevated	Variable	Seldom delirious. Reflexes usually present	May be flaccid or spasmodically active	Traces on skin or mucous membranes. Findings on clothing and in pockets. Odors on breath. Frequent cyanosis
Comatose malaria	Usually rapid and shallow	Usually above 105° F.	Variable	Semi- or unconscious. May have some delusions	Usually passive	Blood examination—spleen—prevalence of malaria. Temperature not much reduced by bathing
Status Epilepticus	Usually rapid	Above normal usually	Variable	Reflexes variable at various stages of spasms	Frequent or almost continuous spasms. Well nourished	Frequent spasm. Cyanosis, changing rapidly
Hysteria	About normal, may be increased	About normal	Variable	Reflexes about normal, usually slightly semiconscious	Relaxed, normal or spastic	Sudden mental or mechanical stimulation usually causes patient to change attitude and make diagnosis plain

flannel and placed along the extremities; hot blankets should also be thrown over the patient. Hot milk, hot egg-nog, bouillons, coffee, etc. are useful. In severe cases, hypodermic stimulation may be necessary: digitalin, strychnine, camphorated oil, or aromatic spirits of ammonia, 10-20 min. well diluted with Sp. Frumenti, may be used. Such stimulation should be used moderately, and as in many other conditions may be overdone. Cooling applications to the head and hands, moderately applied, may have a refreshing effect.

The treatment for heat-stroke cases is such that doubtful cases may be treated for some time without serious injury. When there is doubt, careful observation and frequent physical and other examinations are necessary.

A reduction of body temperature is the first object, and is attained by using means to establish the greatest amount of radiation and absorption of heat from the body. An insolation case will require the constant attention of a physician and one or more attendants for several hours, and should be observed for several days after the temperature remains below 100° F.

The patient may be placed in a bath-tub with enough cold water nearly to cover the body. Two or three persons are required to handle a severe case: one keeps the patient from struggling out of the tub or getting his head under water; another gives vigorous friction-rubs and adjusts the temperature of the water. The physician watches changes in temperature (a thermometer should be constantly used per rectum), in pulse, respiration and general condition; and directs the handling of the patient, the length of time in bath, amount of stimulation, when the change from bath to bed should be made, etc.

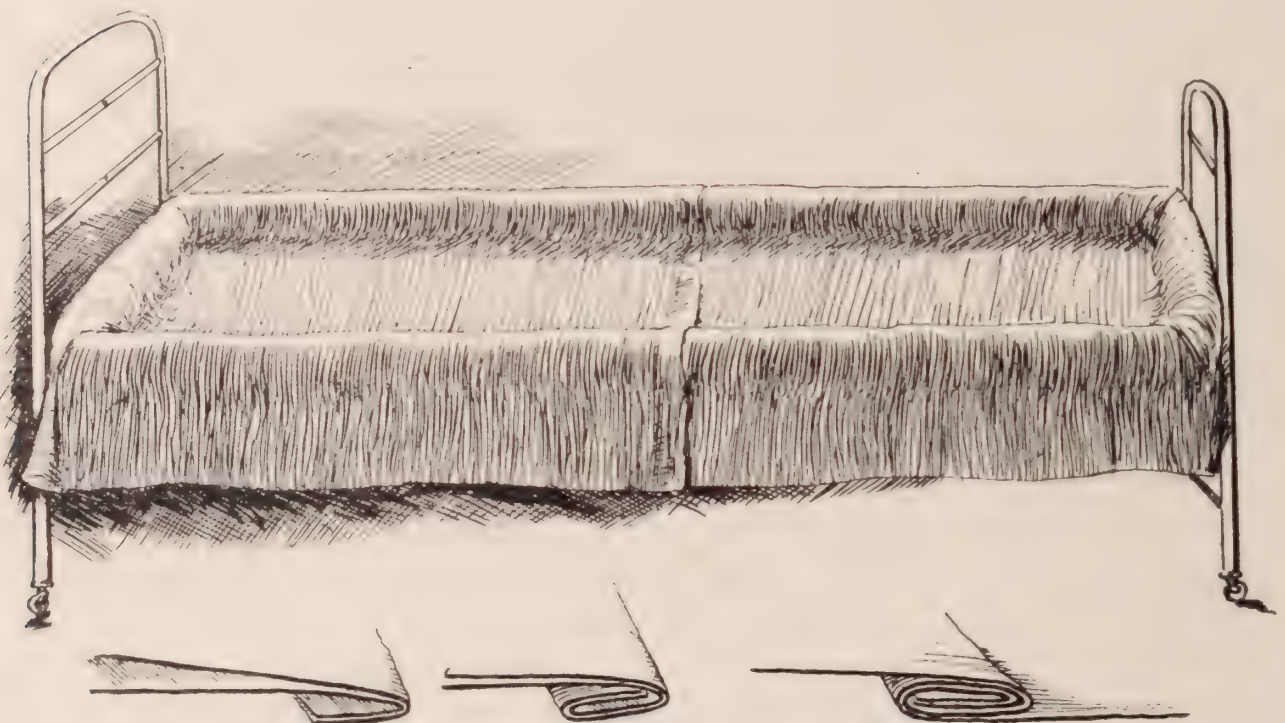
After the patient is placed in water, vigorous rubbing is begun, and ice coarsely cracked is gradually added. The thermometer should be inspected every minute or two. The initial temperature may have been 110° F., and under active treatment it may drop to 94° F. in ten to twenty minutes. When the temperature begins to fall, several degrees may be lost in a few minutes. As soon as the mercury begins declining rapidly, the patient should be placed in a warm bed before it reaches normal. It will drop for several minutes after warmth is applied. Stimulation is used according to the pulse and general condition. The tendency is to use too much hypodermic stimulation. After treatment in bed for a short time, there will be a rapid rise in temperature, and before the patient can be placed in the tub again, the thermometer may register 105° F., or more. Treatment is again instituted to reduce the temperature, and when nearly normal the patient is again placed in bed.

The above-mentioned procedures should be carried out gently. It may require several hours of constant, active treatment before the temperature will assume a non-fluctuating character and remain within safe range.

The marked and rapid fluctuation in heat-stroke cases under active

treatment will assist in distinguishing them from other diseases. As occasion may demand, blood and other special examinations may be made. The urine should be examined early in all cases. A typhoid or other temperature may be reduced to nearly normal by vigorous treatment, but subnormal temperatures are not commonly obtained. I have not observed such a phenomenon, but can conceive of the possibility in weak and exhausted cases. The difficulty of arriving at a diagnosis in such cases occurs more frequently when patients speak only a foreign language.

The treatment during convalescence should be constructive and symptomatic. Frequently it is advisable to recommend a change of occupation or position, since there is less resistance to heat affections after the first attack.



Illustrating a bed prepared for treatment of heat cases—also manner of folding water-proof covers so as to obtain an impermeable joint.

Quite often firemen and others are overcome by the effects of heat and gases. In these instances, the diagnosis is plain from the surroundings, history and condition of the patients. They may or may not be unconscious and there may be no gaseous odor of diagnostic value. Such cases should be treated by combined methods. Stimulation may or may not be required, the pulse being the guide. Cooling applications will be more or less necessary according to the degree of heat affection. If suffocation be the most marked condition, judging from a low temperature, and associated with unconsciousness, etc., the patient should be placed in bed near a window or in the open. The foot of the bed may be elevated and moderate injections of camphorated oil or other respiratory stimulants be given. The above methods may be combined according to the degree of suffocation or heat affection.

Water and ice applications are the best and most convenient mediums for reducing high temperatures. Bath-tubs are not always obtainable and are usually against a wall. It is very convenient to be able to work with the patient from both sides. It has been found that an ordinary bed can be arranged to take the place of a bath-tub, and may afford some advantages. Two or three boards should be placed across the bed under the mattress to prevent sagging. If the bed has a woven wire mattress, the top mattress may be removed. Two firm rolls, six to eight inches thick, are made quickly by rolling blankets, carpets or other material, and then placed lengthwise and about two feet apart on the bed. (See diagram.) Short rolls of pillows or other material is used for the ends. The corners are pinned to prevent spreading. If a full-length rubber-sheet is obtainable, it is placed over the rolls and the improvised tub is ready for use. If such a sheet is not obtainable, two pieces of oil-cloth may be joined as represented in diagram. An impermeable joint is thus formed. The edges of the sheet may be tucked under the rolls.

A bed so arranged has several advantages. It can be made up on short notice and may be placed so that attendants may work from all sides. Three to five gallons of water are sufficient. Ice may be used to advantage, but is not entirely necessary. A thin cloth is placed over the patient and is kept constantly moist. Constant fanning produces rapid evaporation and the temperature is quickly reduced. When the temperature starts down, the water may be let out at one corner of the bed and dry blankets and warmth applied. This plan has been used in very severe cases, and it has been found unnecessary to move the patient during the treatment.

Metropolitan Building.

GENESIS OF INCIPIENT PULMONARY TUBERCULOSIS.

By EDWARD VON ADELUNG, M. D., of Oakland, Cal.

It was some years, after Koch demonstrated the tubercle bacillus, before the majority of physicians realized the possibility of diagnosing pulmonary tuberculosis without finding the bacillus in the sputum. During that interval it was clearly a bold step to tell a patient positively that he was tubercular without having seen the bacillus. And it was considered evidence of diagnostic acumen to be able to demonstrate the presence of tubercular disease by ordinary physical examination alone, *i. e.*, in the prebacillary stage. But attention was then drawn to the importance of physical signs and there followed a period during which gross signs of consolidation and râles were required as the proper basis for positive diagnosis in the absence of the bacillus. The fatal tardiness of these diagnoses was rendered evident by the history of the patient, which showed convincingly that the disease was not being diagnosed early enough. Too large a proportion of the patients died, and pathologists found no difficulty in demonstrating that the destructive process was well advanced before clinical changes were noted. Closer study was therefore devoted to the physical signs of the disease, and such great progress was made that to-day structural changes of surprisingly small extent are detected by trained diagnosticians. Indeed, so keen are some diagnosticians that at times one is inclined to fear that they are self-deceived, and that perhaps a discount of their findings should be made. But even accepting the keenest work at its face value, it must be admitted that the end-results still throw back the same reply,—“too late.” So that even the nicest pulmonary inspection, the most exact mensuration, the most sensitive palpation, or the most delicate percussion here fails to prove of great service. Denied these aids, we have clung to auscultation which alone holds its high place as a means of early diagnosis. But we find that even its value is closely circumscribed. Its service depends not on râles, once regarded as sufficient, nor on bronchial breathing, once considered even more indicative, nor perhaps even on harsh breathing which is still regarded by some as the earliest sign. The auscultatory information now accepted as of value relates to still finer alterations of breathing sounds; so fine, indeed, that they are described only with much difficulty.

The art of auscultation in early tuberculosis has clearly progressed far. Yet, to our dismay, the loss of our patients continues to tantalize us with ever the same criticism, “too late.” Inspection, mensuration,

palpation, percussion, auscultation,—all these means, though keenly applied, still fail to diagnose pulmonary tuberculosis sufficiently early. Discouraged, we ask whether we are not attempting the impossible. Have Auenbrugger and Laënnec actually failed us? We shall see.

The last twenty years have witnessed persistent, progressive attempts to detect tubercular infection of the lungs at the earliest possible moment. We have seen the disease classified first into early and advanced stages; then into incipient, early, and advanced stages; then into latent, incipient, early and advanced stages; and finally into pulmonary, latent, incipient, early and advanced stages. So that we now discover pulmonary tuberculosis before it arrives, as it were.

Criticism falls rather severely on the physician who fails to diagnose a case of advanced pulmonary tuberculosis; yet that happens to-day, not infrequently. We would look askance at one who failed to recognize an early case; yet that occurs quite commonly. We are rather sure that the average physician should be able to discover incipient tubercles in the lungs; yet contrary to the prevalent impression, that is a rare deed. When it comes to the latest diagnostic feat, the detection of the *prepulmonary* stage, we are quite tolerant of error.

There are good reasons for all this: dependable percussion and auscultation are acquired only by years of careful training, and unfortunately their results are very difficult of interpretation. This is partly due to the variability of normal findings, which, as a matter of fact, are not yet fully defined.

The anatomy of the chest, with the variety of tissues, the unsymmetrical arrangement of air-tubes and blood-tubes, the eccentric heart, the bilobar left and the trilobar right lung, and the frequent malalignment of the spine, suggest, *a priori*, that symmetrical points on a normal chest would not yield identical physical signs. In practice we compare symmetrical areas not expecting them to yield the same waves, but studying rather the degrees of difference between them to determine whether they are within normal limits. The prominence of vocal fremitus over the right chest, the dullness of the right apex, the harsher breathing sounds over the right upper lobe are among the commonly recognized differences between the two sides normally. Knopf points out that no two spots on the normal chest give the same voice conduction. Cabot only recently discovered that the normal chest often shows louder and harsher breathing sounds over the left base; and this independently of age, sex, time of day, or food. And furthermore, this finding is sometimes permanent, and sometimes temporary; or it may change from one side to the other. Hence the remark that the physical findings are often difficult to interpret. Sometimes it seems remarkable that we are able to infer as much as we do from physical examination.

While we commonly associate dullness with tubercles, it has been shown that hyper-resonance sometimes results, thus misleading even the best diagnosticians to indicate the wrong apex as the location of disease.

It is interesting to note the variance among authorities regarding the earliest signs of pulmonary tuberculosis. For instance one states that "comparatively slight importance attaches to inspection, palpation, or percussion, in very early cases. It can be assumed that whenever appreciable deviations from the normal are recognized upon inspection, palpation, and percussion, the infection has been of sufficient duration to preclude its classification under the head of incipency. True incipient cases are recognized almost solely through recourse to auscultation. The prominent auscultatory signs, as a rule, do not relate to changes in pitch, quality, rhythm, or intensity of the respiratory sounds, but consist of fine crackling râles heard chiefly at the end of inspiration following a cough."* In contrast with this statement we have another recognized authority declaring that "râles cannot justly be considered as signs of incipency."** One of our best observers fixes on "a rough vesicular respiration, *respiration rude et grave* of French authors, *rauhes Athmen* of German writers," not to be "confounded with harsh, sharp, or puerile respiration with which it had nothing to do." It is defined as follows: "The respiratory murmur is rough and low-pitched, and is made up of a succession of very short sounds, as though small, soft granules of fine, wet sago were being rolled over each other." The difficulty of description is indicated by the fact that the author quoted devotes over a page to the attempt. However, we see that auscultation yields the first physical sign, and that this sign is a rough vesicular respiration. We have scarcely fixed this point when we are immediately warned that exactly the reverse may occur; we must not forget that the opposite of rough breathing, viz., feeble breathing, may be the first sign.

And likewise confidence in the diaphragmatic excursion sign, as observed by Litten's method or by the fluorescent screen, is somewhat shaken when one learns that "slight deviation of the normal descent of the diaphragm is more a matter of clinical interest than of diagnostic value in early tuberculosis. A pulmonary change sufficient to retard the diaphragm is already easily recognized otherwise."

At this point one should recollect that there is a clear difference between what are the earliest signs of pulmonary tuberculosis in an academic sense, and what are the earliest signs in a practical sense. Hair-splitting discussions are profitably avoided.

Under favorable circumstances one can doubtless demonstrate such fine differences in physical signs as those above referred to. But I agree heartily with Minor that "since few patients are seen in the very incipency, harsh respiration, especially in the expiratory phase, will be the change ordinarily found in the majority of incipients," and also with Bonney, that in many cases fine râles are the first sign. It is a regrettable

*Bonney: Pulmonary Tuberculosis.

**Minor: Klebs' Tuberculosis.

matter of common experience that subjects of incipient tuberculosis rarely feel sick enough to consult a doctor; and it is also a regrettable fact that when they do consult a doctor the chances are vastly in favor of the disease being overlooked. It was stated above that not only early cases, but moderately advanced cases, and occasionally well-advanced cases are passed unrecognized by not a few general practitioners; and while this is partly explained by the difficulty of eliciting and interpreting physical signs, it is certainly often due to the absence of marked physical signs such as râles and dullness. However, such cases would never be missed if the examiner required a radiograph in doubtful cases. This method of diagnosis of both advanced and early stages is so important that it may be stated almost dogmatically *that in the presence of unexplained constitutional symptoms such as marked loss of weight, weakness, reduced endurance, or continued impairment of appetite, one should never deny the presence of thoracic tuberculosis unless a negative radiogram has been obtained.* The value of the x-ray in thoracic work is equivalent to urinalysis in abdominal work.

Thus Roentgen comes as an indispensable reënforcement to Auenbrugger and Laënnec. By their combined methods we are enabled to do very good work, and we are about to flatter ourselves that at last we have succeeded in detecting incipient tuberculosis when we are again met by the repulse of end-results,—too many patients die,—and pathology again says “too late.” So we put detectives on the trail of the invisible enemy and learn that his line of invasion is usually by the digestive tube, through whose walls he readily passes leaving no trace behind him, and then locates in the mesenteric glands, or travels by the thoracic duct and bloodstream to the mediastinal or bronchial lymphatic nodes. It is here where he must be detected if we are able to diagnose real incipency, if we are to recognize the prepulmonary stage, if we are to avoid the biting criticism, “too late.” Especially does this conception of incipency apply to children where the incident of glandular tuberculosis prevails over pulmonary.

Mediastinal or peribronchial infection is difficult to detect by physical signs. Aside from the general or constitutional symptoms one relies almost entirely on Petruschky's sign which consists of tenderness over the upper thoracic spines (spinalgia), often confined to the region of the fifth thoracic spine, combined with dullness in the same region. In advanced cases pressure symptoms may occur: stridulous breathing, cough, etc., sometimes accompanied by dullness over the manubrium. In all cases important information may be obtained from the radiogram, the value of which is steadily growing as its technique and interpretation are better understood. When these means of investigation yield a definite positive answer, and when confirmed by the tuberculin tests and the constitutional symptoms, diagnosis of prepulmonary tuberculosis is possible. Whether end results shall again deny the laurels of success, is yet to be learned.

Thus we have witnessed that our most modern conception of incipency passes through many transformations: from prebacillary to early, incipient, latent, and, finally, prepulmonary recognition. While we must not lose sight of the highest ideal, which demands diagnosis of *pathologic* incipency,—an avowedly difficult task,—there is another ideal far easier of attainment by the average practitioner, on which I am inclined to place emphasis. This realizable ideal is the detection of the disease before large pulmonary areas are involved,—a thoroughly practical idea, to be attained by simply exercising more care in employing the ordinary standard methods of examination. But as long as many physicians examine the chest without removing the clothing from the thorax, as long as many fail to require the patient to cough during auscultation, as long as negative diagnoses are made without a temperature record, or adequate sputum examination, and especially without a radiogram, no apology need be offered for missionary efforts looking toward improvement in the recognition of early tuberculosis.

MEDICAL AND SURGICAL PROGRESS.

ORTHODIAGRAPHY OF THE HEART.

A REVIEW OF RECENT LITERATURE.

By E. H. SKINNER, M. D., of Kansas City.

1. Achelis: Regarding the Orthodiagraphic Demonstration of the Apex of the Heart. (*Muench. med. Wochenschr.*, No. 43, 1910.)
2. Beck: Orthodiagraphic Examinations of the Size of the Heart in Tuberculosis Pulmonalis. (*Deutsch. Archiv. fuer klin. Medizin*, Bd. C., Heft 5.)
3. Block: Normal Negatives of the Heart and Their Clinical Significance. (*Deutsch. med. Wochenschr.*, No. 36, p. 1656, 1910.)
4. Claytor and Merrill: Orthodiagraphy in Pathological Conditions of the Heart and Aorta. (*Amer. Journ. Med. Sciences*, No. 4, Vol. CXL.)
5. Francke: Die Orthodiagraphie. Monograph. J. F. Lehmann, Munich, 1906.
6. Franze: Orthodiagraphische Praxis. Monograph. Otto Nemnich, Leipzig, 1906.
7. Gröedel: Die Orthoroentgenographie. J. F. Lehmann, Munich, 1908.
Roentgendiagnostik in der inneren Medizin. J. F. Lehmann, Munich, 1909.
8. Hirschfelder: Diseases of the Heart and Aorta. J. B. Lippincott Co. 1910.
9. Kœhler: Teleroentgenography of the Heart. Roentgentaschenbuch. Band II. Otto Nemnich, Leipzig, 1910.
10. Mackenzie: The Oliver-Sharpey Lectures upon Heart Failure. (*Lancet*, No. 4571, Vol. CLXXX., and following.)
11. Mohr: Demonstration of the Radiological Diagnosis of Adipositas Pericardii. (*Muench. med. Wochenschr.*, No. 10, p. 543, 1910.)
12. Osterroth: Displacement of the Lungs Dependent upon Congenital Defects. (*Deutsch. Militær. Zeitschr.*, Heft II., 1910.)
13. Schwarz: Upon a Typical X-Ray Finding in Hearts of Obese Individuals and its Anatomical Foundation. (*Wiener klin. Rundschau*, No. 51, 1910.)
14. Vasquez and Bordet: Concerning the Comparative Value of the Orthodiagraph and Percussion in Mitral Stenosis. (*La Semaine Médicale*, p. 217, 1909.)

15. Van Zwaluwenburg and Warren: Diagnostic Value of the Orthodiagram in Heart Disease. (*Archives of Internal Medicine*, No. 2, Vol. 7, 1911.)

The superiority and advantage of heart outlines obtained by the x -ray over the outlines as secured by percussion seems to be no longer in question. By percussion we are obliged to distinguish a relative dulness of the left border of the heart and a dulness upon the right side which is obscured by the sternum. The use of the parallel x -ray in modern orthodiagraphic apparatus gives us practically the absolute outlines of the heart and the shadows of the pericardium, when the latter has undergone pathological changes with cast shadows.

The orthodiagram obtained by parallel rays must not be confused with a skiagraph made from a single focus point. The orthodiagram is more easily interpreted than the ordinary x -ray negative, all that is necessary being a simple knowledge of anatomical topography. Another advantage is the rapidity with which an orthodiagram can be obtained and the expense required for the x -ray negative is avoided.

In modern orthodiagraphic apparatus there is no danger to the patient or the operator, as the tube is covered by an x -ray proof shield, and only a small pencil of parallel rays is allowed to penetrate the opening in the lead diaphragm which is about 2 cm. in diameter. This pencil of x -rays is thrown upon a fluorescent screen, which is in turn covered by a lead-glass plate for protecting the eyes and face of the x -ray operator while conducting the procedure. The operator should also wear heavy leather or x -ray-proof gloves.

Orthodiagraphy is a valuable adjunct to the ordinary physical examination of the heart and mediastinal vessels, of which it is capable of making fairly accurate outlines, as well as measurements which can be compared with the normal and also with subsequent orthodiagrams of the same patient. Kœhler has advocated teleroentgenographs or negatives taken of the heart with the tube at least two metres distant from the patient and with the x -ray plate upon the chest anteriorly. He claims that with the source of the x -ray being at this great distance, there is very little increase in the size of the shadow over the actual size of the heart, and, further, that this slight error is not any greater than the error which can be attributed to the unsteadiness or to the visual error of the operator making the orthodiagraph. Constant practice diminishes the possibility of error in orthodiagraphy. But it is true that the expense of teleroentgenographic apparatus is less than orthodiagraphic. A poor technique in orthodiagraphy should be discarded in favor of teleroentgenograms.

The study of the moving heart with its pulsations in the various chambers, and of the great vessels, by means of the fluoroscope, and the outline of the exact heart mass by orthodiagraphy is receiving an increasing amount of support. We have been studying the heart sounds and their significance, just as we have been paying so much attention to the careful chemical analysis of the stomach contents. We now find that much valuable information, in fact, far more important information can be obtained from the study of the gastric motility; and there is every reason to believe that the study of cardiac motility will yield increasing diagnostic assistance, beyond percussion and auscultation.

Mackenzie in the recent Oliver-Sharpey lectures fails to justify our time-honored notions regarding the diagnostic significance of the various valvular sounds, and takes issue with all our preconceived ideas about

heart failure and compensation. He places great stress upon the study of auricular fibrillation. As this affects the motility of the auricles, it may be presumed that the fluoroscopic examination will offer assistance in this connection.

Up to the present time the orthodiagraph has been used mostly in determining heart outlines and classing them with the various lesions now recognized by certain valvular sounds and changes in mass outline. But it would seem that the studies in heart diagnosis by means of the x -ray had about reached the point that stomach radiology reached some years ago, before the importance of the study of the gastric motility was emphasized. We are familiar with the orthodiagraphic outlines of the heart as produced by various valvular defects or changes in the muscular walls. But this is the diagnosis of terminal pathological changes and not the study of the incipient stages. It is in the study of the motility of the heart, just as in the stomach, that the earliest diagnostic symptoms will be found.

The recent article of Claytor and Merrill does not offer any peculiar information that has not been published several years ago by various European radiologists, but it is pleasing to note that at least in a few American centres the use of the fluoroscope and the orthodiagraph is receiving justifiable attention. America seems to be on the verge of giving more attention to this method of x -ray diagnosis, which for many years has been *obscured* either by an indifference or fear among American physicians and radiologists.

Claytor and Merrill discuss orthodiagraphy under headings, entitled Accuracy of Results—Practical Value of Orthodiagraphy and Possibilities of Error—Aneurysm of the Thoracic Aorta—Valvular Lesions. Then follows a series of classical illustrations with descriptions. They feel that the orthodiagraph is of real value to the clinician, and that as it becomes more commonly used we may be able to formulate useful facts which as yet it is unwise to attempt. While they do not feel that its use is demanded in all cases or is even necessary, it may still be of great aid in many of the more or less obscure pathological conditions of the heart and aorta.

Van Zwaluwenburg and Warren have likewise offered in the English language and before an American audience the results of their studies upon the index of the cardiac area in comparison with the body weight. There is little new in this article beyond the previously published monographs of some years ago by Franze, Francke and Grædel. They have, however, with scientific care and accuracy, studied the dimensions of 60 orthodiagrams which are classified according to diseases. They feel justified in the conclusion that "an abnormal dimension index is an early evidence of the increase in size of one or more chambers of the heart and may occur before such an increase can be demonstrated by other means; that a decrease in the index results from left ventricular hypertrophy and dilatation, and that an increase indicates a dilatation of the auricles with or without hypertrophy of the right ventricle. In combinations of these two antagonistic factors the index will depend on the predominance of the one or the other. The wide variation shown in valvular diseases should make the index valuable in the diagnosis of doubtful or combined lesions, and it is hoped that the smaller fluctuations found associated with renal conditions may sometimes be of diagnostic and prognostic value." Their method of obtaining the cardiac index is ingenious and worthy of attention, but is too technical for the purposes of this review.

Hirschfelder, in his recent textbook, offers a few pages upon this subject, which, while elementary in technique, are worthy of attention because of the conclusions. Hirschfelder says that it is possible by means of the fluoroscope to watch the individual contractions of the heart and note the changes in the size due to systole and diastole, although this is very difficult. But he thinks that the contraction of the auricles can be seen with considerable definiteness, and dissociation of the rhythm of heart-block can often be diagnosed in this way by simple inspection.

Aside from the orthodiagraphic information regarding the dilatations of the various chambers of the heart, this method lends valuable assistance in determining changes in position and form of the heart in congenital and acquired alterations in the thoracic anatomy, which may be only suspected by ordinary physical examinations. Osterroth reports the case of a recruit, previously healthy, who entered the hospital after his first jumping exercises. The physical examination revealed, upon the posterior lower left lung area, a dullness with bronchial breathing. No fever. In the heart area there were full resonance and vesicular breathing. Heart dullness was to be found in the posterior thoracic wall under the angle of the scapula, and the apex-beat was determined in the seventh intercostal space in the posterior axillary line. By the anteroposterior orthodiagram, a wide change of heart shadow to the left, which located the heart entirely in the left half of the thorax, not even reaching the spinal column in the middle. The oblique upper border of the heart shadow showed pulsation. It, therefore, appeared that a portion of the left lung, apparently the inferior lobe, was very small following a congenital atelectasis, and that the high degree of change in the heart area to the left and posterior had ensued.

Concerning the comparative value of the orthodiagraph and percussion in mitral stenosis, Vasquez and Bordet report that while in the anteroposterior position the normal orthodiagram shows a more or less small distinguishable arch of the left heart shadow, that in distinct mitral stenosis the form of the left heart line is nearly vertical. The usual arch, which in the normal condition is the left ventricle of the heart, is failing. More important is the condition of the shadow of the left auricular appendage, which is markedly enlarged by an outward curve extending backward frequently to the spinal column. Not infrequently in the oblique position, the shadow of this appendage obscures the normal interval between the heart and the spinal column.

Both Schwarz and Mohr report upon the typical changes in orthodiagraphic outlines of fatty hearts. Schwarz has been able to determine the deposition of the fatty layer by the filling out of the usual angle between the heart apex and the diaphragm. In post-mortem examinations, some of these cases showed small fatty deposits measuring 2.5 to 3 cm. in thickness. By the use of the very soft tube, these appear to be small dark shadows which can be recognized apart from the shadow of the heart itself. Aside from the use of the soft tube, Schwarz cautions one to make the orthodiagram during deep inspiration, as the high position of the diaphragm can cover up the entire phenomena.

Mohr's article is a repetition of Schwarz's findings, but he also adds that in the oblique diameter one sees these contracting masses of fat upon the heart contour. By the fluoroscopic examination one sees, in contradistinction to the usual movement of the heart action, that these lateral cloudy masses do not move and are also uninfluenced by the diaphragmatic movements; while if there are pericardial adhesions or

pleuritic adhesions these shadows do move. Mohr refers to deposit of fatty masses upon the pericardium in these fluoroscopic symptoms.

Since it is difficult to obtain a good shadow of the apex of the heart under the usual methods, Achelis has suggested the inflation of the stomach with carbonic-acid gas to make the apex more apparent. The best degree of transparency is secured by moderate inflation. His method consists in offering the patient, who has come in a fasting condition, about 4 gm. of tartaric acid dissolved in a half-glass of water and then a wafer containing about 2 gm. of powdered bicarbonate of soda. Usually the heart is displaced upwards a slight degree and towards the left, assuming a transverse position. By this procedure, however, the heart mass itself does not undergo any change, although there may be pathological changes in the outlines of the heart mass as regards the position, form and shape of the different parts of the heart shadow.

Beck discusses the size of the heart in pulmonary tuberculosis. He finds that the size of the heart in tuberculosis can be influenced by different diseases; for instance, by nephritis, valvular defects, and congenital cardiac weakness. In 30 cases of pulmonary tuberculosis all of these conditions were eliminated, and it was ascertained that there was a lessening in the heart volume in tuberculosis, when compared with the relative normal size and weight of body.

Block presents a method of measuring the heart shadow by always applying the focus of the *x*-ray tube to one point upon the chest and then erecting a system of charts in which the study of such shadows will be indicative of the various changes in outline produced by different pathological changes, although these may be distorted shadows. While not giving the true size of the heart, yet, by comparison with a constant or normal distortion, the relative changes in pathological outlines will be noted. The advantage is claimed to lie in the fact that an *x*-ray installation of great power and high price is avoided.

THE RESULTS OF SALVARSAN TREATMENT IN DISEASES
OF THE NERVOUS SYSTEM.

A REVIEW OF RECENT LITERATURE.

By SIDNEY I. SCHWAB, M. D., of the Editorial Staff.

1. Finger: Important Accessory Manifestations in Patients Treated with Salvarsan. (*Berl. klin. Wochenschr.*, No. 18, May, 1911.)
2. Westphal: A Death after Treatment with Salvarsan in Spinal Diseases (Tabes-Meningitis Spinalis Syphilitica) with Microscopical Examination of the Cord. (*Berl. klin. Wochenschr.*, No. 22, May, 1911.)
3. Mattauschek: The Results of Salvarsan Treatment in Nervous Diseases. (*Zeitschr. fuer die gesamte Neurologie und Psychiatrie*, April 11th, 1911.)
4. Schreiber: A Retrospective and Prospective View of the Present-Day Status of Salvarsan Therapy. (*Neurologisches Centralblatt*, No. 10, May 16th, 1911.)
5. Bresler: Salvarsan: The Ehrlich-Hata Remedy in Nervous Diseases of Syphilitic Origin. (*Psychiatrisch-Neurologische Wochenschr.*, No. 5, April 29th, 1911.)

Sufficient time has elapsed since the first reports of the effect of the treatment of salvarsan upon syphilis and nervous diseases due to syphilis to form some kind of an estimate of the present trend of opinion on the subject.

Inasmuch as the importance of the syphilitic origin of many diseases of the nervous system had been admitted even before Ehrlich's discovery and Wassermann's specific reaction, it is natural to expect that among the early cases upon which this remedy was tried were the various types of diseases of the nervous system due to syphilis. The principal question to be decided was, and is, whether some of the bad results following salvarsan injections in tabes, paresis and some other conditions were really due to the injection, or to the natural development of the disease itself.

Finger (1), in one of the early articles, entitled "Serious After-Results in Patients Treated with Salvarsan," makes particular note of the fact that the after-effects should be carefully studied and cannot always be explained by the relapses due to the progress of the disease. He says that if the theory that its symptoms are to be regarded as uninfluenced syphilis relapse—that is, symptoms that would have occurred even if salvarsan had not been injected, it should not be forgotten that in addition there are two other possibilities: One, the possibility of a direct relationship between the symptoms and the drug; then, the possibility of a combined effect of the arsenic with the syphilis, in the sense that the first creates a *Locus Minorus Resistentiae*, towards which the syphilitic infec-

tion tends to become localized. In some of the cases of nervous diseases in which salvarsan was tried this condition has been termed "Neuro-Recidiv," or what may be translated as the relapse of the disease expressed in new or recurring nervous symptoms. In this paper of Finger's he gives an account of three cases of optic neuritis which followed injections of salvarsan.

Westphal (2), in a very remarkable paper entitled, "Fatal Case of Tabes Plus Meningitis, treated with Salvarsan, with microscopic examination of the Spinal Cord," describes a case in which he demonstrates the weakness of the theory that symptoms on the part of the nervous system following salvarsan are to be attributed to the so-called neuro-recidiv. A résumé of his case is as follows: A syphilitically infected woman, who showed all the symptoms of a cerebrospinal meningitis of syphilitic origin, together with tabes, was given an injection of "606," in a neutral solution, in the right and left gluteal muscles, and seven hours afterwards there developed, suddenly, difficulty in breathing, followed by death, with the symptoms of respiratory paralysis. Particular attention is called to the disease foci located in the anterior roots of the third and fourth cervical segments. The conclusion to be derived from this case seems to be that in the presence of a process implicating the phrenic nerve, the salvarsan injection should certainly never be given. As it is impossible to know this before the injection, any meningitis which shows the slightest trace of cervical localization should be regarded as unfavorable for salvarsan injection.

Mattaushek (3), in an article which describes his experience in the treatment of various kinds of nervous diseases with salvarsan, calls attention to one case quoted by Spietoff, in which a patient with latent secondary lues and stupor developed epileptic attacks following the injection, and likewise the observation of Eversbusch, in which a child who had passed through meningitis three years before, became a victim of epileptic attacks following the injection. A number of cases of death following salvarsan injections are to be found in case reports of paresis in whom epileptic, or convulsive seizures are frequent. The material brought forward in this paper is concerned with 27 cases of various kinds, including latent lues, meningomyelitis, spinal lues, cerebral lues, etc. Of these 27 cases, 12 showed great improvement. In 12 cases of tabes the author quotes 5 as being favorably affected by the injection. His conclusions are about as follows: If salvarsan is used with perfect technique and method, it is almost without danger and is an unusually energetic and effective therapeutic measure for diseases of the nervous system caused by syphilis. Its results are much quicker than are obtained by the use of mercury or iodide. In early cases of cerebral and spinal diseases, where it is necessary to obtain prompt results, it is indicated. (In this respect the author differs essentially from Ehrlich's recommendations.) Even in tabes, especially in the active form, salvarsan gives good results, particularly in respect to the irritant symptoms. In early paresis, salvarsan may be permitted, but in well-developed cases there is no good result to be anticipated. As a relative counter-indication against the intravenous method can be mentioned heart failure, severe heart neurosis, arteriosclerosis, alcoholism and diabetes. Absolutely contraindicated are cases in which atoxyl, or any like preparation has been used, or nervous diseases in which the localization is found in important centres, especially in tumor cases, and particularly in advanced cases of paresis, in which convulsive attacks are found.

Schreiber (4) says, in a discussion on this subject, that the neuro-recidiv phenomenon will disappear if salvarsan is repeated in smaller doses. He considers that it is necessary to demonstrate the Wassermann reaction—not only in the blood, but also in the cerebrospinal fluid.

In an article by Bresler (5), entitled, "Salvarsan in Syphilitic Diseases of the Nervous System," the author has gone over carefully all the hitherto published cases on this subject. His article really forms a complete review of the subject; it goes through more than five numbers of the journal in which it is published, and is a complete résumé of the subject. He particularly makes note of the remarks of Ehrlich himself on the subject of "606." Inasmuch as frequently in the consideration of the effect of salvarsan on diseases of the nervous system, due to syphilis, the fundamental principles and conclusions of Ehrlich on the experiences hitherto obtained are lost sight of, it might be well to quote as follows: First, Ehrlich insists upon the specific and directly fatal effect of the remedy on the spirochæta. It does not penetrate into the tissues, the dose is too small, or the absorption insufficient, or the spirochæta from which its strength is derived is immune to arsenic. Secondly, the formation of specific antibodies in the use of "606" is shown by the fact that the milk of syphilitic mothers treated with "606" has been effective in the treatment of the hereditary syphilitic offspring. The serum taken from patients who have been cured by "606" exercises, after the injection, a curative influence upon the syphilitic products, particularly in the case of the new-born. This method is in cases of sucklings more effective than the injection of "606." In such cases the latter can be used afterwards as a definite therapy. Thirdly, the influence of the Wassermann reaction. It is given in a number of different percentages, since in many cases in the early stages of the primary effect, and sometimes in malignant syphilis, the negative reaction found at first becomes positive after the injection. This is explained by the fact that the number of spirochætæ was too small to produce the Wassermann reaction, and it is by means of the injection of "606" and its effect in the dissolution of the spirochætæ, and as a result of the reabsorption of the anti-toxin that the reaction becomes positive. The Wassermann reaction is in its last analysis the reaction of the organism to the reabsorption of the products of the spirochætæ; that is, of the metabolic products, or endotoxins, so that in uncertain cases the injection of "606" can be of differential diagnostic importance. A positive Wassermann reaction that continues is a positive proof of the syphilitic character of the disease. A case in which the reaction remains positive after treatment must be regarded as uncured. With the disappearance of the reaction, the patient can be said to be cured if this disappearance is lasting; otherwise it may have to do only with a temporary negative phase, resulting from the fact that following the injection the number of organisms becomes so lessened that the remainder were too few to cause a reaction to take place.

The so-called Herxheimer reaction, Ehrlich explains as an evidence of the insufficient effect of the remedy, due to small doses, which causes merely an irritation of the spirochætæ, thereby producing larger doses of toxin.

Ehrlich, at the time of his address, reports on a material of 10,000 cases treated with "606." There has been in this material not a single case of ocular disturbance which can be brought into relation with the drug. Only a few cases of death could be traced to the use of the drug. For example, a weak individual with tertiary lues of the larynx was given

the preparation in an acid solution; a very marked local reaction followed. Death was due to shock, which Ehrlich believes was due to the method of giving the drug. In other deaths amounting to scarcely a dozen, and had to do principally, or almost altogether, with patients with severe diseases of the nervous system, such as tabes and cystitis, cachexia, bulbar symptoms, extensive cortical softening and similar conditions. In one case, syphilitic disease of the phrenic nerve, due to a meningitis in the cervical cord, was the cause of death. Ehrlich insists that, when the drug is used in individuals who are victims of otherwise fatal diseases, death resulting cannot be wholly laid to the door of "606." He recommends, according to Alt, in nervous diseases due to syphilis, that not over 0.4 gm. be given. The spirochætæ are present in small numbers, and for that reason smaller doses of "606" result in the killing of the organisms. According to Alt, about 75 per cent. of the deaths which have followed the use of this drug have been found in cases of severe diseases of the nervous system. "606" not only kills the spirochætæ that can be easily reached, but also those in all syphilitic new growths and tissues. The dissolution and disturbance of these structures cause a kind of inflammatory process to be set up; thus in the brain or spinal cord such a change of the local and general pressure might cause symptoms of paralysis, or irritant phenomena, which, as a rule, are only temporary. In all cases in which there is a tendency towards excitement, or convulsions, the remedy should not be used, and should not be used in old cases of paralysis, or when the paralysis has become spastic in type. In the early stages of tabes a great many have shown subjective and objective improvement.

Wechselmann saw in a great many cases of tabes, definite improvement. In several cases of optic neuritis, the result of "606" was favorable; likewise in cases of a beginning or advanced optic nerve atrophy. Wechselmann found that following the injection, the process did not seem to advance, but he has never observed that the patient grew worse. According to him, a fresh optic neuritis is a contraindication against the treatment. (It might be added here, by way of remark, that in conclusions of this kind, which the followers of Ehrlich are prone to emphasize, the question of time is important. Inasmuch as the whole subject of "606" is only two or three years old, the remark by Wechselmann, that he had seen no bad results in optic atrophy following the injection, is altogether premature, and such uncritical remarks should be severely condemned. Nor must it be forgotten, either, that an optic atrophy is frequently stationary and shows improvement, or slight improvement, with many other drugs besides either "606" or mercury.)

Stern, in a case of syphilitic meningomyelitis, saw no result four weeks after the injection.

Scholtz gave the injection in 2 cases of labyrinth lues. At first the tinnitus was worse, but after about two weeks there was some slight improvement.

Gruven calls attention to the fact that not only syphilitics, but also non-syphilitics show general constitutional improvement following the injection; therefore, he recommends its use in a greater variety of non-specific cases.

Friedlander reports the results of 14 cases of syphilitic nervous diseases upon which "606" was tried. These were chiefly tabes, psuedotabes, and muscle paralysis and headaches. Subjectively, in all of these cases the treatment was effective. The patients felt more cheerful and stronger.

Objectively, a favorable influence of the treatment on the patient, especially on the gastric crises, but particularly its influence on the unbearable and depressing headaches must be mentioned; in a few days such symptoms disappeared.

Blumenfeld remarks that luetic headaches frequently disappeared in twenty-four hours.

Ledermann saw no result in cases of tabes three weeks after the injection. In one case of tabes the ataxia did not seem to be much influenced.

The criteria for improvement, permanent or temporary, in these articles are extremely intangible. Improvement may mean absolutely nothing in cases of this kind, because it may be solely the mental reaction, due to a new method of treatment for which great hopes are held out. In none of these reports, seemingly, do the authors submit any positive anatomical proofs that the treatment has in any way affected the organic basis of the disease. Such improvements as have been noted in the majority of the cases have been obtained frequently by other means, which are not specific in the sense of aiming directly at the origin of the disease-process.

Marschalko believes that among those who have had sufficient experience with salvarsan, the fear of the bad results of the injection on the optic nerve has not been realized. Even beginning atrophy of the optic nerve is, according to him, no contraindication for the use of the remedy—that is, if it is advisable to use it on other grounds. He has records of several such cases from the eye clinic, that received injections and showed no bad effects. He believes that he has seen in some cases an improvement. He describes one fatal case in a forty-two-year old man who had suffered for a long time from paresis. From this and other experiences, Marschalko has excluded from the class, which might be benefited by “606,” paralytics in the advanced stage. He can report no special results, but in some cases a very definite period of remission. How far this bears any relation to the specific effect of the remedy, he leaves in doubt. In 2 cases, at any rate, together with the period of remission there appears a definite lessening of the positive Wassermann reaction. Marschalko reports more favorably in tabes. In two cases of beginning tabes the results, according to him, were brilliant. In one, the rigidity of the pupil, which had existed for several months, disappeared. In another case, the gastric crises, which had existed for four years, together with lancinating pains, disappeared six days after the injection. All these favorable conditions remained three months after the injection. In two other cases of old tabes, of eight and twelve years’ standing, the high degree of ataxia became better and the patients themselves felt much stronger.

Deutschmann attempts to compare the symptoms on the part of the eye produced by “606” and those found in the eye in cases of chronic arsenic poisoning, taking as his data particularly the Manchester epidemic of 1900. The theory as pointed out in this paper is wrong, because in “606” injections the arsenic is found in the blood-stream and has a particular and constant effect on the optic nerve, by means of lymph through the nerve sheaths; this is not the case in the epidemic cases.

Torday gives an account of 16 cases of tabes treated with “606.” It showed no good results, nor did it in cases of progressive paralysis, dorsal myelitis and epilepsy. On the other hand, in one case of cerebral gumma, on the first day after the injection, the headache, vertigo and

nausea disappeared and the gait became normal; the ptosis, the abducens paralysis and diplopia remained unaffected. The latter group of symptoms, however, disappeared promptly a few months later under mercury.

Kribich states that the neuro-recidiv has become the central theme of importance in the whole question. If it is found that after salvarsan injections there is a renewal of symptoms, then the new therapy will fail, as far as nervous diseases are concerned. If, on the other hand, by means of the intravenous injection, the relapses can be prevented, or influenced, by the treatment, then we are in a position to believe in a remedy whose results in many cases belong to the most imposing which the physician has had an opportunity to see, as far as instantaneous, or almost instantaneous, curative results are concerned. He finds that cases of neuro-recidiv are generally found in intramuscular, or subcutaneous injections. They do not seem to occur as frequently by the intravenous method. The harm to the nervous system can be explained if this fact is substantiated by the longer period of arsenic reabsorption from the arsenic deposit in the muscles.

Bettmann has observed 2 cases of herpes zoster following salvarsan injection.

Weintraud in about 30 cases of tabes and one case of paralysis noticed no improvement. Cases with arteriosclerotic disease of the brain, based on syphilis, and those who had a number of apoplectic attacks, seemed to bear the intravenous injection very well and even showed some improvement.

Enough quotations from Bresler's article have been given to show the extent and large clinical material over which the Continental men have command. It seems that the German physicians, especially, are using "606" in a great many more instances of nervous diseases than we are. They do not in any sense seem to fear the results, as far as the eye is concerned, that we do in this country. In trying to arrive at some conclusions as to the value of "606" in this class of cases, we are met with a mass of data which is in no condition either to be understood or utilized. The constant repetition of improvement, or the reverse with no particular data nor any definite determination of what improvement means, certainly leaves the investigator as doubtful as ever. One thing only seems to be assured, and that is, that in advanced cases of paresis and in such cases in which epileptic seizures are common, "606" is detrimental. There is no record of any cured cases of tabes or paresis. There are no records, as far as the present writer can ascertain, of "606" accomplishing more than was previously accomplished by mercury—that is in cases of paresis, tabes, and cerebrospinal syphilis in early stages. There is certainly greater mortality and a greater danger in the use of "606" than there is in mercury, and for that reason, all things being considered, the use of "606" should be limited to that kind of case which shows no response to mercury.

It must be further understood that if an individual who happens to have a nervous syphilis has need of the "606" treatment as far as his general symptoms are concerned, and because he has been inadequately treated in the first instance, the existence of his nervous syphilis should not be considered in the light of a contraindication. [E.D.]

NASAL TUBERCULOSIS.

A REVIEW OF RECENT LITERATURE.

By WILLIAM B. CHAMBERLIN, M. D., of the Editorial Staff.

1. Caboche: Contribution to the Study of Tuberculosis of the Nasal Mucosa. (*Archives of Otology, Rhinology and Laryngology*, Vol. 17, pp. 180-242, 1908.)
2. Chiari: Tuberculomas of the Nasal Mucous Membrane. (*Archiv. fuer Laryngologie*, Bd. 17, pp. 454-483, 1905.)
3. Gerber: Tuberculosis and Lupus of the Nose. (*Handbuch der Laryngologie und Rhinologie*, Bd. 3, pp. 901-930.)
4. Gerst: As to the Manifestations of Nasal Tuberculosis. (*Archiv. fuer Laryngologie*, Bd. 21, pp. 309-324, 1908.)
5. Gleitsmann: Treatment of Tuberculosis of the Upper Air-Passages. (*Archiv. fuer Laryngologie*, Bd. 21, pp. 111-119, 1908.)
6. Hajek: Tuberculosis of the Nasal Mucous Membrane. (*Internationale Klinische Rundschau*, 1889.)
7. Katz: Tuberculosis of the Nasal Septum. (Diseases of the Nasal Septum, pp. 83-100.)
8. Onodi (*Deutsch. med. Wochenschr.*, 29, 1906).
9. Pasch: Clinical Contribution to Nasal Tuberculosis. (*Archiv. fuer Laryngologie*, Bd. 17, pp. 454-483, 1905.)
10. Renner: Nasal Tuberculosis. (*Annals of Otology, Rhinology and Laryngology*, September, 1909.)
11. Roehenbach: Nasal Tuberculoma. (*Archiv. fuer Laryngologie und Rhinologie*, XXIV., No. 2, p. 231.)
12. Schmidt: Diseases of the Upper Air-Passages.
13. Thrasher: Report of a Case of Nasal Tuberculosis. (*Lancet-Clinic*, 1905.)
14. Zarniko: Diseases of the Nose and Naso-Pharynx.

Nasal tuberculosis is an affection rarely met with or at least rarely reported. Thrasher in reviewing the literature in 1905 collected 112 articles with 125 cases reported; while Chiari in 1894 reported only 21 cases, six of these being his own. If one accepts the theory of Koch and his followers that the inspired air is the principal source of tubercular infection, this immunity of the nasal mucosa is indeed striking; for this is the portion of the respiratory tract with which the air-stream first comes in contact. In addition, the cartilaginous septum, the favorite location for tubercular involvement, is subjected to frequent insults from scratching with dirty and infected finger nails and handkerchiefs; not to mention the irritation from the inhalation of dust-laden air. This immunity of the nasal mucosa may be attributed to the filtration action of the vibrissæ, the currents caused by the ciliated epithelium, and the well-known bactericidal action of the nasal secretion. Such natural

barriers are partially overcome, at least in the cases of nasal stenosis so frequently met with, the moist and warm vestibule of the nose furnishing here an ideal spot for the settling and rapid growth of all sorts of organisms.

Zarniko classifies tubercular involvement of the nose in two main divisions: (1) the tuberculoma, or proliferative type, usually met with in strong, robust individuals and regarded as the primary form, and (2) the ulcerative, occurring as an end-infection and complicating a primary tuberculosis of the lungs and larynx. Renner, quoting Gerber in Heymann's "Handbook," makes four divisions: (1) tuberculous ulcer, (2) diffuse infiltration, (3) tuberculoma and (4) lupus. Diffuse infiltration and tuberculoma he regards merely as stages of the same process, while the term lupus he considers may well be dropped, inasmuch as this is merely the term applied by the dermatologist to a lesion of the nasal mucosa which has extended to the nose and face. Professor Gleitsmann adopted the above classification in his report at Vienna in 1908; but Hajek, Michelson and Zarniko have given up entirely the term nasal lupus and speak only of nasal tuberculosis. This classification of the proliferative form as primary, and the ulcerative form as secondary seems rather too arbitrary, for pulmonary tuberculosis can by no means be excluded simply because definite physical signs are absent. It would seem that the question of primary and secondary forms might well be left to the speculation of metaphysicians, and that we as clinicians concern ourselves rather with the manifestations of the different forms as we find them.

The proliferative form of nasal tuberculosis, as before mentioned, is found more frequently in strong, robust subjects, and attacks by preference the cartilaginous septum. The bony septum, nasal floor and turbinates may be involved secondarily. The form of the neoplasm may vary from low or high granulations with a broad base, to even a polypoid tumor with distinct pedicle. The latter form, however, is rare. The color may be a dull dirty gray, pale red or even purple; while the character of the surface, as well as the consistency, may suggest sarcoma. The absence of pain is a striking feature; patients as a rule seeking relief only on account of the nasal obstruction. Fetor is usually absent. Although the tendency to ulceration is slight, areas of necrosis may usually be found, with sharp undermined edges and bases covered with secretion and low granulations. Neighboring structures are involved by continuity; mucosa, bone and cartilage being in turn attacked and perforation of the septum in time resulting.

The disease is usually one of great chronicity, terminating in time, if unchecked, in a descending tuberculosis of the naso-pharynx, pharynx, laryngeal tonsils, larynx and lungs. As complications may be mentioned secondary involvement of the accessory lymph glands, the middle ear by way of the Eustachian tube, and the conjunctiva through the tear-ducts. The tip of the nose and adjacent portions of the face may present the usual evidences of lupus. It is on account of the latter affection that many patients first consult a dermatologist.

The histological picture is fairly characteristic, with diffuse heaping up of round cells and typical giant-cell tubercles. While the tendency to caseation is slight, most authors regard the finding of such areas as important for the diagnosis. The finding of the tubercle bacilli *in situ* is often a matter of extreme difficulty. In the purely proliferative form they are also rarely met with in the nasal secretion. Renner asserts that

in the proliferative form an absolute diagnosis cannot be made clinically, but only by microscopical examination, and cites Onodi who diagnosed a tumor of the septum as carcinoma from the clinical picture and microscopical examination of an excised portion. After radical removal of the tumor he found it to be a tuberculoma. In the ulcerative type the clinical diagnosis, without microscopical examination, is fairly easy.

Zarniko considers the differential diagnosis from syphilis as being the most difficult and mentions the following points:—

1. Syphilis is associated with an intense inflammation of the surrounding mucosa; tuberculosis is not.
2. Syphilis involves primarily the bone; tuberculosis the cartilage.
3. Feter is usual in syphilis; rare in tuberculosis.
4. Headache and involvement of the branches of the trigeminus are common in syphilis; wanting in tuberculosis.

As additional points in the differential diagnosis may be mentioned the histological examination, the administration of potassium iodide, the Wassermann reaction and the injection of tuberculin. The general examination should not be overlooked, though Zarniko calls attention to the fact that we may find syphilis in a tuberculous subject. As a rule, the differentiation from sarcoma and foreign bodies covered with granulations presents lesser difficulties in diagnosis.

The treatment of nasal tuberculosis is entirely surgical and consists first in the removal of all new growths with snare, forceps or curette, and the treatment of the resulting wound with lactic acid, the electro-cautery or dry superheated air, until epithelialization takes place. Such treatment results in most cases in a retarding of the process; often in complete cure. The care of the general health of the patient should not be overlooked: fresh air, forced feeding, and local cleanliness.

Whereas the first form of nasal tuberculosis is found in subjects in apparently good health; the second, or ulcerative form, occurs usually in those in whom the general disease is far advanced. The outlook here, as in secondary involvement of the pharynx and larynx, is proverbially bad. Diagnosis, in view of the general condition of the patient, presents few difficulties, while treatment is, in the main, palliative only.

THE RELATION OF PREGNANCY AND LABOR TO CARDIAC DISEASE.

A REVIEW OF RECENT LITERATURE.

By HUGO EHRENFEST, M. D., of the Editorial Staff.

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2. Cameron: Heart Disease and Pregnancy. (*Amer. Journ. of Obstetrics*, September, 1908.)
3. Fellner: Heart and Pregnancy. (*Monatschr. f. Geb. u. Gyn.*, Vol. 14, p. 370.)
4. Green: Blood Pressure in the Toxemias of Pregnancy. (*Boston Med. and Surg. Journal*, April 28, 1910.)
5. Harrar: Management of Cardiac Disease with Broken Compensation During Pregnancy and Labor. (*Bull. of Lying-in Hospital of New York*, 1909.)
6. Hirschfelder: Diseases of Heart and Aorta. J. B. Lippincott & Co., 1910.
7. Hirst: Importance of the Blood-Pressure in the Toxemias of the Latter Half of Pregnancy. (*New York Med. Journ.*, June 11th, 1910.)
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9. Jaschke: Prognosis of Pregnancy and Labor in Cases of Cardiac Disease. (*Archiv. fuer Gynaek.*, Vol. 93, p. 466.)
10. Link: Accidental Heart Murmurs in Pregnant Women. (*Muench. Med. Wochenschr.*, April 14th, 1908.)
11. Mackenzie: Diseases of the Heart. Oxford University Press. 1910.
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13. Pouliot: Pulmonary Edema During Pregnancy and Parturition. (Original in *Archives Générales de Médecine*, December, 1909. Reviewed in *Journ. Amer. Med. Assoc.*, Feb. 19th, 1910, p. 658.)
14. Slemons and Goldsborough: The Obstetrical Significance of the Blood-Pressure. (*Johns Hopkins Hospital Bull.*, 1908, p. 194.)
15. Starling: Value of Blood-Pressure Determinations in the Toxemia of Pregnancy. (*Lancet*, Sept. 10th, 1910.)
16. Wenzel: Pregnancy and Labor in Women Suffering from Heart Disease. (*Monatschr. f. Geb. u. Gyn.*, Vol. 26, p. 506.)

Recent literature has not revealed any new or startling changes in the views concerning the intricate relation of pregnancy and labor to the normal or diseased heart. Rather gradually have we been persuaded that most of the older writers have exaggerated the dangers of impregnation

for the woman suffering from a cardiac disease. "No marriage for the unmarried, no pregnancy for the married, no nursing for the confined" is a harsh rule laid down by a French writer and quoted in many text-books, but lately usually with the restricting statement, that it is not entirely compatible with the results of recent investigations.

In studying the mutual influence of pregnancy and cardiac disease upon each other the following points are of main importance: 1. The effect of normal pregnancy upon the normal heart; 2. The effect of a pathological pregnancy upon the normal heart; 3. The effect of pregnancy and labor on the diseased heart; 4. The effect of cardiac diseases on pregnancy; 5. The treatment of heart disease complicated by pregnancy, with special consideration of the question of artificial abortion; 6. The management of labor, and 7. The problem of matrimony for the sufferer of a heart lesion.

The Effect of Normal Pregnancy upon the Normal Heart.—According to Hirschfelder, the effect of pregnancy upon the heart is influenced by several factors. The gradual pushing upward of the diaphragm as the uterus grows causes the heart to assume a more transverse position, raising the apex usually to the fourth interspace. A reflex vagus inhibition is often present. During pregnancy the heart is forced to put forth increased efforts. Slemmons and Goldsborough have confirmed Fellner's previous findings, that during pregnancy the average blood-pressure, pulse-rate and cardiac output are larger than in the non-pregnant woman. Hirst found in 100 non-pregnant women the blood-pressure, measured with Faught's instrument, to average 112 mm. Hg. In 100 normally pregnant women, who at no time showed albuminuria or any constitutional sign of toxemia, the pressure was found to be 118. In the last third of pregnancy the blood-pressure seems to rise gradually, averaging, in the middle of the last month, 124. According to Slemmons during the labor pains there is often a rise of 50 mm. Hg. in the maximal pressure, though these elevations are of short duration.

The increase in size of the heart, supposed to represent a hypertrophy developed as a result of the prolonged increase in work, as Hirschfelder states, is probably due in part to dilatation of the heart, and in part only suggested by the increased area of dullness resulting from the change in position of the heart. James Mackenzie has shown that the dilatation during pregnancy affects the right heart particularly, and that in very many cases even of otherwise normal women a definite insufficiency of the tricuspid valve may appear, disappear and reappear. The presence of this insufficiency is shown both by the positive venous pulse and the systolic murmur in the tricuspid area. In this connection Link's article must be mentioned, calling attention to the frequent appearance of accidental non-organic murmurs during pregnancy. Examining 330 apparently healthy pregnant women he was able to detect an accidental murmur in 41 (12.4 per cent.). Only in 3 of them, one being markedly chlorotic, this murmur could be heard after labor. Discussing the various theories offered in explanation of this phenomenon, he comes to the conclusion that this murmur is caused by a slight kinking of the larger vessels, especially the pulmonary artery, as the result of that peculiar dislocation of the heart during pregnancy. It is obvious that special care must be taken in the differentiation of this accidental murmur from one produced by a mitral insufficiency. In the latter the murmur is most distinct over the apex and less pronounced over the pulmonary artery. The non-organic murmur of pregnant women is practically limited to the area of the pulmonary artery.

Moran considers it quite possible that varying degrees of temporary dilatation of the heart occur in pregnancy, similar to that appearing after great exertion. In this manner the cardiac mechanism is capable of maintaining the circulatory equilibrium without undergoing appreciable hypertrophy or increasing markedly the blood-pressure.

The Effect of a Pathological Pregnancy upon the Normal Heart.—Interest in the question of the effect of a pathological pregnancy upon cardiac function has been awakened with the introduction of reliable and practical instruments for measuring the blood-pressure. We have already referred to Hirst's investigations concerning the normal blood-pressure in pregnancy. In 39 women suffering from eclampsia, and in 18 others with a marked albuminuria he found the pressure at its lowest at 142 mm. Hg. The highest blood-pressure recorded in a woman without eclampsia was 192 mm., the highest in a woman with eclampsia was over 320 mm. Starling is convinced that during the whole period of a normal pregnancy the blood-pressure remains approximately normal, *i. e.*, varies between 110 and 120 mm. Any rise above 125 would make him suspicious that the pregnancy was not quite normal and would put him on the look-out for some degree of toxemia. Of course, any rise at the beginning of labor or during its course is due entirely to the pain or muscular exertions. According to Green, in impending, mild, and acute cases of eclampsia the blood-pressure increases markedly and falls after delivery as the symptoms subside. In very grave and fatal cases there is an extreme increase in the pressure. In eclampsia the blood-pressure seems definitely related to the type of case and, therefore, its observation is of value in prognosis and treatment. In cases of chronic nephritis, *e. g.*, the toxemia is relieved by delivery, but the cause is not removed, and in these cases the pressure remains at an abnormal height. There are other non-toxic renal conditions observed during pregnancy, differentiable by the persistently low blood-pressure.

The Effect of Pregnancy and Labor on the Diseased Heart.—In the belief of the internist, pregnancy is one of the most serious complications of cardiac disease. So eminent a physician as Leyden claimed that about 40 per cent. of all women with serious heart lesions meet their death in connection with childbirth. In the light of very large statistics compiled by obstetricians, such views are erroneous and greatly exaggerate the actual dangers. Investigations made by Fellner on the immense material of Schauta's clinic, and to-day quoted by every contributor to this subject, have led to a distinct change of opinion. Fellner believes that in obstetrical work only in about 14 per cent. of the cases is the presence of the heart lesion actually recognized, while probably in 86 per cent. of the cases this complication is overlooked because the cardiac symptoms do not become manifest. The infrequency of heart disease during pregnancy, Moran writes, emphasizes the importance of a thorough physical examination of the patient and constant supervision during gestation, in order that the complication may be promptly detected, and such measures undertaken in the interest of the mother and infant as the exigencies of the case may determine. Reference must be made in this connection to the fact that the introduction of Momburg's belt constriction makes the careful examination of the heart of every pregnant woman imperative because the application of the belt is strictly contraindicated in the presence of any form of cardiac anomaly. But during pregnancy unusual difficulties present themselves in the diagnosis of minor cardiac lesions and in the detection of a break in compensation, probably the most important feature from a prac-

tical point of view. There are a change in the position of the heart, changes in the area of dullness, changes in pulse-rate and blood-pressure and frequently, as mentioned, accidental murmurs appear, or even a "physiological" relative tricuspid insufficiency of muscular origin (MacKenzie) may exist. Edema of the lower extremities or even of the genital organs may be caused solely by the pressure of the heavy uterus against the pelvic veins. In the last third of pregnancy dyspnea is rather commonly met with. The diagnosis of a broken compensation during pregnancy, therefore, as Hirschfelder states, depends upon signs which are relative rather than absolute. "Dyspnea and cyanosis on very slight exertion, such as quietly walking a distance of a few hundred yards or less, walking up a few stairs, etc., and the presence of a small rapid pulse, persistent cough, enlargement of the liver, and edema of feet and legs may be regarded as the most important symptoms. The earlier in pregnancy they occur, the more alarming they are."

The dangers of heart lesions in pregnancy, according to Jaschke who made a very extensive study of the question, in general is overrated. Valvular lesions, at least, are not as dangerous as is often stated, and this also holds true for the mitral stenosis. Quite different is the situation in regard to diseases of the heart muscle, especially in the cases of chronic myocarditis due to infections or intoxications. They often lead to serious complications. In the opinion of Cameron, the primiparity or pluriparity of the patient (representing a marked difference in duration and severity of labor), her general health and nutrition, the condition of the kidneys, the amount of compensation present and the ease with which it is upset or restored, the patient's ability to remain quiet in bed free from exertion and excitement, and the way in which she responds to treatment—all these things are of more importance in estimating the probable outcome than the kind of anatomical lesion present. Similar views we find expressed by Harrar: While the complication of pregnancy and labor with failing or lost compensation is not very common, it is of greatest importance because the mortality both of mothers and children under these condition is very much greater than is commonly supposed. The particular nature of the cardiac lesion does not seem of great importance as regards the prognosis. The prognosis is distinctly impaired in the presence of a renal lesion. Among recent writers we find only Wenczel expressing the belief that his own experience bears out the claim generally made that a mitral stenosis offers special dangers. The particular nature of the heart lesions, as Moran points out, has considerable bearing on the clinical phenomena resulting from them. Mitral insufficiency predisposes to asystole and edema, aortic insufficiency to syncope and epistaxis, while mitral stenosis may lead to cerebral embolism, post-partum hemorrhage and hemiplegia. Pouliot discusses the special danger of an acute edema of the lungs, one of the gravest complications of parturition, both for mother and child. The resulting asphyxiation of the mother invariably leads to the intrauterine death of the fetus.

The two main dangers arising from the complication of a cardiac lesion with pregnancy are the break of compensation, already referred to, and degenerative changes in the myocardium with consequent cardiac failure. Mackenzie emphasizes the importance of this fact. If it be borne in mind that heart failure is essentially a question of the integrity of the heart muscle, a better standpoint will be obtained for judging these cases. The valve lesion in the great majority is at the most only an embarrassment to the heart in its work, and one which it may easily overcome. The

presence of the lesion, however, is important in that it calls attention to the heart and may remind us that the disease which has injured the valve may also have injured the muscle. Our object must be to find out in these cases the extent of the lesions to the muscle, and how far the valve lesion embarrasses the muscle. Given a fair response to increased efforts with no or little enlargement of the heart, then pregnancy need have no terrors. If the response is limited, if palpitation is readily induced by exertion, opinion should be suspended until the result of treatment is ascertained. If the condition does not improve then the outlook is not hopeful. It must be kept in mind that patients with valvular lesions may suffer from most severe heart failure (dilatation and extensive dropsy), and make such good recoveries, that repeated pregnancies may be undertaken with impunity. Mackenzie calls attention to the fact, undoubtedly often overlooked by the obstetrician, that after the delivery is over the patient is not out of danger, for symptoms of severe heart failure may supervene any time within the next three weeks.

The Effect of Cardiac Disease on Pregnancy.—The effect of a cardiac lesion on a coexisting pregnancy finds its most pronounced expression in the premature expulsion of the uterine contents. It is this fact which accounts chiefly for the high fetal mortality of a complicating maternal heart lesion given by Harrar as 33 per cent. Fellner, whose figures are very low, places the frequency of premature spontaneous termination of pregnancy at 20 per cent., other writers at from 40 to 60 per cent., *e. g.*, Blacker at 44 per cent. Jaschke, who contributes the most thorough of recent studies, even believes that valvular lesions do not seem to predispose to premature termination of pregnancy. Abortion actually seems to occur only if the compensation becomes disturbed. The spontaneous premature termination of pregnancy is ascribed to various causes. Circulatory disturbances lead to congestion of the endometrium. Rupture of vessels results in apoplexies of the placenta or hemorrhages between placenta and decidua. The prevalence of placenta circumvallata in cardiopathics has been explained by circulatory difficulties in the peripheral portions of the placenta. If placental respiration is interfered with or the oxidation of the maternal blood becomes defective, the fetus may die in the uterus from asphyxiation. In some instances the carbon-dioxide intoxication of the mother causes premature uterine activity.

The Treatment of Heart Disease Complicated by Pregnancy, with Special Consideration of the Question of Artificial Abortion.—While most writers agree that a cardiac lesion during pregnancy calls for the customary general and medicinal treatment without any special consideration of the coexisting pregnancy, the same consensus of opinion is lacking in regard to the value of artificial interruption of pregnancy in certain cases. Clinicians, like Leyden, who believe that pregnancy places every cardiopathic woman in great danger, plead for an extensive use of artificial abortion early in gestation. As a rule, obstetricians are more conservative. The gravest dangers to the mother undeniably develop during labor itself, and this fact should be kept in mind whenever the termination of pregnancy is considered. It makes the prognosis of interference less favorable in all serious breaks of compensation when the thought of obtaining relief by emptying the uterus suggests itself most forcibly. Hence, artificial interruption of pregnancy cannot be accepted as a routine procedure. However, there is no doubt that this radical form of treatment is permissible and will prove advantageous under certain conditions. The

indication for the operation will be ascertained by careful treatment and by careful study and observation of its effect in the individual case. If interruption of pregnancy has been decided upon, that method should be resorted to which will guarantee the shortest labor and the least strain on the patient.

Blacker thinks that in the great majority of instances the ordinary medicinal treatment suffices, and that only in the cases of exceptional severity the induction of abortion or of premature labor becomes necessary. According to Harrar interruption of pregnancy is seldom expedient. He enumerates the following indications for interference: 1. If compensation fails badly before the sixth month of pregnancy; 2. If compensation is not regained after a month's rest in bed with use of the customary medicinal and general therapeutic measures; 3. At or after the thirty-sixth week of pregnancy in an attempt to ensure an easier labor; 4. In desperate cases, or when patient is moribund, for the purpose of saving the child. Jaschke believes that only serious decompensation, occurring possibly only in one per cent. of all cases, may justify artificial termination of pregnancy. The most complete description of the medicinal and general treatment of these cases is given by Hirschfelder. As long as compensation is good the patient should merely be carefully watched but no medication need be resorted to. At the first sign of cardiac weakening or dilatation (dyspnea and cyanosis, etc., on slight exertion), absolute rest should be insisted on and digitalis or strophanthus should be given. This procedure should be insisted upon even if the diagnosis of organic valvular lesion is not definite, for these procedures will afford quite as much relief in cases of functional tricuspid insufficiency. Moreover, they should be repeated at the slightest indication, especially toward the end of pregnancy. It is advisable to give in such cases a few prophylactic doses of digitalis when labor seems imminent, or a few doses of strophanthus at the beginning of labor pains, so as to have the tonus of the heart muscle at its optimum by the time the strain of the second stage of labor is imposed upon it. At periods of acute dilatation, and especially when pulmonary edema sets in, venesection affords the greatest relief. If cardiac symptoms disappear the patient may gradually be allowed up and around, but she must be more careful than before, and if signs of a second break in compensation occur, termination of the pregnancy should be seriously considered. This is especially true in cases of mitral stenosis in which the cardiac accidents of pregnancy are particularly frequent. Hirschfelder thinks that Fellner's strikingly low mortality in this particular type of cardiac lesion is probably due to the practice of the Schauta clinic, to terminate pregnancy in cases of mitral stenosis as soon as the slightest signs of broken compensation appear.

The Management of Labor.—In the presence of an uncompensated heart lesion, labor must be managed with particular care. If there is the slightest sign of heart failure, Mackenzie writes, the patient should be instructed not to bear down, and chloroform should be administered very early, the anesthesia being gradually deepened. As soon as it is feasible, forceps should be applied, and gentle, firm traction intermittently maintained until delivery is effected even if forceps have to be on for a considerable time. "I have never seen the slightest risk from chloroform in these cases." And I may quote here a sentence written by Hirschfelder: "As in other conditions, ether is preferable to chloroform when the heart is diseased."

Most writers advise shortening of the duration of labor, especially of

the most dangerous second stage, by manual or instrumental dilation of the cervix, by applying the forceps, or resorting to version and extraction. Patients with a pronounced dyspnea feel more comfortable in a high reclining position during labor. It is a generally accepted practice to bandage the patient's abdomen or to place a heavy sandbag (8 to 10 lb.) upon her abdomen as soon as the baby is born. This is done for the purpose of preventing a too rapid fall in the blood-pressure by a sudden filling of the abdominal blood-vessels. Such treatment will be most effective if the sandbag is placed on the abdomen before the fetus is expelled. Harrar advises the application of the forceps with the patient in the sitting position. If in the third stage the pulse becomes irregular and weak with evidence of a dilatation of the right heart, a post-partum hemorrhage is to be encouraged. For this reason many writers advise against the use of ergot after labor in these cases. Occasionally when the pulse is small and weak without symptoms of dilatation of the right heart, the tight abdominal binder is strictly indicated. Jaschke, whose very conservative views have been recorded repeatedly in this article, states that during labor a complicating heart lesion can be considered neither an indication for, nor a contraindication against operative interference. In view of the possible grave danger of a suddenly developing pulmonary edema, Pouliot advises to be in readiness to hasten delivery by instrumental measures, if necessary. He emphasizes that salt solution, whenever required, should be given only in fractional doses and subcutaneously, never intravenously. Asphyxiation is best combated by immediate venesection, withdrawing at least 500 grms. of blood. The danger from loss of this amount of blood when the woman already has lost a considerable quantity is much less than the danger from the acute edema of the lungs. The heart should be maintained in serious cases in the meanwhile with the usual tonics. He advises injecting up to 10 c.c. of a 10 per cent. solution of camphorated oil, which is not only a vigorous tonic for the heart, but also has a sedative action on the respiratory spasm.

Brief mention must be made in this connection of the attitude of various writers concerning the advisability of permitting mothers suffering from heart lesions to nurse their children. It seems obvious that in very serious cases breast-feeding is contraindicated. While in less serious cases the placing of the child on artificial food ensures to the mother more quiet and rest, which may seem advantageous, it must not be forgotten that this expected advantage may be more than offset by mental anxiety and worry of the mother, if the usual difficulties are encountered with the artificial feeding of the child, which in these instances often is born in a weak and frail condition.

The Problem of Matrimony for the Sufferer of a Heart Lesion.—A striking disharmony of opinion still prevails concerning the one eminently important problem of matrimony for the girl suffering from a cardiac lesion. I have already quoted the French writer who unconditionally denies to the cardiopathic woman the right to marry. Among recent writers I find only Moran taking a similarly radical attitude. He is firmly opposed to marriage, "for no matter how well compensated the lesion is, pregnancy always exerts a baneful influence, exposes the patient to the danger of toxemia and dystocia, while if she passes safely through childbirth she may be left with a crippled heart for the remainder of her life." Such an attitude seems indefensible. First of all, matrimony and pregnancy are not identical terms. Reliable statistics furthermore prove convincingly that a large number, in all probability the largest

majority of women with well-compensated lesions, pass through pregnancy without any noticeable ill effect. Marriage to many girls means an improvement of their social conditions, it may mean a life of comparative ease as compared with the possible necessity of earning a living by work. These are factors worth considering when the physician is asked the question whether a certain girl should be permitted to marry. The indiscriminate denial of marriage to all women having valvular lesions would imply inexcusable injustice to many of them.

In cases of valvular lesions, Blacker writes, heart failure will occur sooner or later, but whether its onset will be precipitated by childbearing admits of argument, and it is doubtful if the risk of this is so marked as to justify denying her the right to marry. In the opinion of Jaschke a compensated heart lesion offers the right to prohibit matrimony only in the presence of a concomitant pulmonary or renal disease. In view of the undeniable dangers of an accompanying myocardial affection, however, he emphasizes the necessity of careful functional tests before permission to marry is granted. He also believes that an essential paroxysmal tachycardia will make it advisable to counsel against matrimony. To avoid the dangerous complication of an acute pulmonary edema during labor, Pouliot would exclude from marriage the girls who have an adherent pericardium, and those in whom a mitral lesion is complicated by an albuminuria. I shall close with a quotation from Mackenzie: "The nodal rhythm should be a bar to pregnancy in all cases. Although the valvular lesion by itself is not a contraindication, yet the particular valvular lesion influences the decision when it is combined with indications of muscle failure. Thus aortic lesions are very serious unless there be a good intact heart muscle. Mitral stenosis, when there is only a presystolic murmur and good effective muscle, is no bar; but if there is also a diastolic murmur, then unless the muscle is very good, pregnancy should not be permitted, as the diastolic murmur points to a progressive narrowing of the orifice."

Consistently, only the question of permission to become pregnant should be considered in relation to the problem of cardiac disease. Very often the physician is called upon to act as judge after marriage has been consummated, often after one labor has brought the patient into a serious condition. He will have to decide whether the prevention of impregnation seems permissible, desirable, or is absolutely necessary, and in the latter situation will have to consider the temporary or permanent sterilisation of the patient by operative means.

PRACTICAL MEMORANDA.

THE USE OF WOUND CLIPS IN PERINEORRHAPHY.

By FREDERICK J. TAUSSIG, M. D., of St. Louis.

About two years ago a suggestion was made almost simultaneously by American and German gynecologists to use metal wound clips (Michel) for the closure of the skin in repair of the pelvic floor. I have since that time used them in about 20 cases, and have been very favorably impressed with the improved results thereby obtained.

In all operative work about the perineum there is special danger of infection because of the proximity of the anus. Wherever catgut is exposed to such infectious material, it presents a good culture medium for bacterial growth. For this reason many gynecologists have avoided its use in perineal work. The objection to silkworm gut is that it cuts through and thereby allows bacteria to enter the deeper tissues. Some operators have employed the subcuticular buried catgut suture for closing the skin. My personal experience with this suture is that it is not adaptable where the skin is so thin and loose as over the perineal body.



These facts induced me to try the metal clips. At first I employed them for the tissues about the vaginal fourchette as well as over the perineal body, but I found that about the fourchette they caused considerable pain and irritation, and pinched through quickly, thus making them difficult to remove. I therefore have of late limited their use to the skin of the perineum.

After the usual flapsplitting operation with exposure of the levator ani fibres on either side, I have been using the following suture material for the repair of the pelvic floor:—

1. No. 2 catgut, double, three or four interrupted sutures for the levator ani muscle.
2. No. 2 catgut, single, three or four interrupted sutures for the deep and superficial fascia.
3. No. 2 catgut, single, purse-string suture closing the vaginal end of the cut, and one interrupted suture approximating the skin of the fourchette.

4. Three or four Michel metal clips for closing the skin.

The clips effectively prevent the entrance of fecal material into the wound, and by merely pinching the superficial tissues do not allow infection of the deeper structures. It is important to remove the metal clips not later than the sixth or seventh day after operation, as they otherwise cut through and become difficult to unfasten.

My experience, in a few cases of recent perineal tears after childbirth, would lead me to condemn the use of metal clips in such cases. The tissues are at this time so edematous and soft that the clips cut through in a few days, become buried and are difficult to remove. Ordinarily there is no pain connected with removing skin-clips from the perineal skin.

SIMPLE METHOD OF PREPARING THE SKIN FOR SURGICAL OPERATIONS.

By E. H. BECKMAN, M. D., of Rochester, Minn.

A little over a year ago one of our staff, while visiting clinics in Italy, saw a method of preparing the skin for surgical operations in use in the clinic of Dr. Bastianelli in Rome, which we have used continuously since that time and have found simple, economical and effective. It is as follows:—

The method of preparation consists of applying two solutions to the dry skin. The first solution is composed of one part of iodine crystals to a thousand part of benzine. Solution No. 2, consists of three and one-half per cent. tincture of iodine made by diluting the ordinary tincture one-half with alcohol. If it is necessary to shave the field of operation before preparing the skin, this should be shaved either dry or by using benzine so that no water is absorbed by the cells of the tissues. Or, if desired, the field of operation may be shaved some hours before. Solution No. 1 is painted over the field of operation with a piece of gauze, simply rubbing enough to remove all dirt and scales from the skin. All the benzine should be allowed to evaporate, leaving the skin absolutely dry before solution No. 2 is applied. Solution No. 2 is then applied by painting over the field of operation with a pledget of cotton or a piece of gauze, saturated with the tincture of iodine. One coat of each solution is sufficient.

We have found this method of preparing the skin suitable for all classes of cases. The only type of case in which we do not use it is in exophthalmic goitre, where it is contraindicated on account of the iodine. It is simple, easy to apply, inexpensive, and, so far as antisepsis is concerned, as efficient as any method we have ever tried.

It is a particularly good method of preparation for emergency cases, especially cases of injury to the hands or arms in persons who have been working in grease. If it is desired, one can have in the emergency-room two vessels containing the above solutions. The injured part can be immersed in solution No. 1 and allowed to dry, and then immersed in solution No. 2, after which the patient is ready for operation.

After having used this method of preparation in all classes of cases for more than a year, we can recommend it. Care should be taken not to let the solutions run down into the creases in the groin, for when they dry slowly the skin is blistered. The tincture of iodine should not be too old, or it may become irritating.

FOR OBTAINING THE MAXIMUM EFFICIENCY FROM LIQUID GLASS DRESSINGS.

By HERMANN B. GESSNER, M. D., of New Orleans.

At one time plaster-of-Paris dressings were applied by wrapping layers of gauze around a part and then rubbing into the meshes a plaster cream. This was repeated until the desired thickness had been applied. The result was lack of uniformity and strength. To-day every one uses gauze bandages whose meshes have been previously filled with the plaster; proper soaking before use completes their preparation. Liquid glass, according to my observation, is to-day employed as plaster-of-Paris was twenty years ago: a dry gauze bandage is applied, then the glass is painted on with a brush, this process being repeated until enough of bandage and of glass appears to have been laid on. A better way is to thin the sodium silicate, as it comes from the dealer, with hot water to the point where it flows easily. The gauze bandages are then dipped in the diluted glass until every fibre is soaked with it; they may then be applied like the wet plaster bandages. When thus used liquid glass gives a firm support, which in equal thickness with plaster-of-Paris, almost if not quite equals it in strength, while having the advantage of greater lightness. Its only disadvantage is the prolonged period of drying and hardening—eighteen to twenty-four hours—which makes it unavailable for fresh fractures and other conditions that require a rapidly-hardening means of immobilization.

THE HUNT FOR THE AMEBA.

By S. STROUSE, M. D., of Chicago.

It is not uncommon for the diagnosis of amebic dysentery to be missed on account of failure to demonstrate motile amebæ in the stools. The secret of doing this lies in using fresh stools, keeping them warm, and examining them immediately,—remembering that not only the stools, but the slides and the microscope likewise must be kept warm. Possibly as simple and efficient technique as can be employed is the following. The microscope is put on a radiator, or if electric light is available, a bulb is placed under the stage of the scope. This light will serve as heater and illuminant. The microscope should be as near the patient as possible. A high rectal tube is passed, and the fecal matter, often containing blood or mucus, found in the eyelets of the tube is transferred to a warm slide, covered with a warm cover slip, and immediately studied. In case it is necessary to carry the tube to a laboratory, this is best done by arranging two pans like a chafing-dish, the lower one containing water at about 100° F., the upper one resting on the water, and containing the tube. Before the diagnosis of amebæ is justified, one must find unicellular organisms, showing actively motile pseudopodia, and moving from place to place by the activity of the pseudopodia.

DIAGNOSIS OF FETAL POSITION.

By H. EHRENFEST, M. D., of St. Louis.

The practice of basing the diagnosis of the fetal position upon the location of the centre of most distinct fetal heart-sounds is incorrect and

unreliable; nevertheless, it appears to be very prevalent. The position of the fetus should first be ascertained by careful palpation. A simple consideration then will determine where the fetal heart-sounds should be most distinctly audible. Auscultation of this area will at once prove or disprove the correctness of the palpatory diagnosis. As the result of finding heart-sounds in an unexpected position, this mode of procedure will convey to the examiner, in some instances, the first suspicion that a certain palpated head and back cannot belong to the same fetus. The proper course of examination—first palpation, then auscultation—is one of the most important and advantageous means of detecting an unsuspected twin pregnancy.

HOW TO MAKE LABORATORY MOSQUITOES BITE.

By CREIGHTON WELLMAN, M. D., of Oakland, Cal.

Those who conduct experiments with biting insects, under laboratory conditions, are sometimes greatly hindered and even frustrated in their investigations by the refusal of the mosquitoes, etc., in captivity to bite men and animals readily. Borrowing a leaf from the books of our grandfathers who encouraged leeches in the same way, I have found that often when mosquitoes are refractory, wetting the skin slightly with fresh milk will tempt them to bite.

REFERRED PAINS DUE TO PROSTATITIS.

By JOHN R. CAULK, M. D., of St. Louis.

Pains in the back and down the legs (lumbago and sciatica), and, occasionally, pains simulating renal colic associated with hematuria, are frequently due to prostatitis with periprostatic adhesions involving the pelvic nerves, and to a verumontanitis. Relief is often obtained by a systematic treatment of the prostate, breaking up the lateral adhesions, and by application to the verumontanum through the endoscope.

THE PREPARATION OF TISSUE FOR MICROSCOPICAL EXAMINATION.

By CARL FISCH, M. D., of St. Louis.

It is a well-known fact that material is often sent to the laboratory in such condition that it is impossible to study it with any degree of accuracy. When one remembers that tissues contain about 85 per cent. of water, it is easy to understand that a small amount of active preservative will necessarily be diluted; sometimes to the extent of 20 per cent. With alcohol this dilution acts not as a fixing but as a destroying medium of the structure. Only too often a large tumor is squeezed into a container that is no larger than the tumor itself; the narrow spaces between the tumor and the container being then filled with alcohol or other preservatives. The outcome of this procedure is that the inner portion of the tumor is not fit to study, on account of the inability of the small quantity of alcohol to counteract the quantity of water contained in the tumor. Similar results obtain with formol and Zenker's fluid.

The quantity of the preservatives selected should at least be ten times the volume of the tissue, since it is a fact that the larger the quantity of

the preservative the better are the results, as regards microscopical examination. Of course it must be understood that in those specimens in which the pathological changes are easily recognized, the necessity of the quantity of the preservative is not very important; but when the study of the cell structures is the object the importance of the quantity of the preservative cannot be questioned.

As to the best media which should be employed, opinions are not at one. Hansemann, for instance, objects to the use of formol, because it causes deposits of blood-pigment in the tissue. This, however, is not a well-founded objection as it requires considerable length of time for formol to cause these deposits. Tissues hardened in formol for two days, then washed in water and dehydrated by alcohol are free from these deposits. The formol material (2 days) can be secondarily dealt with by other fixatives, bringing about the same effect as is obtained by primarily using them for fixation of fresh tissue.

Now, despite any objection to formol as a fixing agent, it can be stated that it is the best medium which we have, provided it is used in a 10 per cent. solution. But for the differentiation of granules and the staining of the various forms of leucocytes, alcohol is the best medium that can be employed. The great advantage, however, which formol possesses over alcohol is that it perfectly preserves the red corpuscles, whereas alcohol changes them to mere shadows. Where the structure of a pathological formation is clearly outlined, a diagnosis may be arrived at during an operation by making frozen sections. Thin pieces are placed for two or three minutes into a 10 per cent. solution of formol and washed in water shortly afterwards.

The important point to remember, as regards the preparing of a specimen for microscopical examination, is the matter of using a large quantity of a preserving fluid. For references bearing on this point, I will call the reader's attention to two authorities in microscopic work—namely, D. V. Hanseman: "Some Remarks on Microscopic Technique" (*Berlin. klin. Wochenschr.*, No. 38, 1910), and C. Benda: "The Question of Surgical Material for Microscopic Diagnosis" (*Berlin. klin. Wochenschr.*, No. 50, 1910).

DRESSING OF THE DONOR'S SURFACE IN CASES OF SKIN-GRAFTING BY THE THIERSCH METHOD.

By HERMANN B. GESSNER, M. D., of New Orleans.

The raw surface left by the removal of strips of epidermis with a razor by the Thiersch method is usually dealt with by one of two methods: either the surface is liberally dusted with aristol or some other drying powder and then covered with absorbent gauze, or some non-adhering dressing like oiled-silk or gutta-percha tissue is laid on. Each of these methods is followed by some good and some indifferent or unsatisfactory results. A simple treatment of this surface and one that has afforded uniformly satisfactory results consists in applying sterile strips of ZO rubber adhesive plaster. This combines the non-adhering quality of oiled-silk and gutta-percha with the stimulating properties of the zinc oxide, which tends to promote epidermization. The strips must be long enough to project beyond the raw surface and adhere to the dry, unbroken epidermis bounding it. They may be changed readily at intervals of three or four days without injury to the developing epidermal cells.

CORRESPONDENCE

MEETING OF THE CANADIAN MEDICAL ASSOCIATION IN MONTREAL.

(From Our Special Correspondent.)

The forty-fourth Annual Meeting of the Canadian Medical Association opened in Montreal on Wednesday, June 7th, and continued up to Friday evening, June 9th. The attendance was large, many McGill University medical graduates having come for the opening of the new medical building of that University, which took place on the previous Monday. The program arranged for the meeting was excellent and was carried out in a satisfactory manner. The meetings were held in the new medical building of McGill University, which is peculiarly well adapted for such a purpose. The first general meeting was held in the anatomical laboratory, when the President-Elect, Dr. George E. Armstrong, was installed; addresses of welcome were given and reports and minutes were read. Dr. Armstrong soon after his installation was compelled to leave the room through illness. On Wednesday afternoon meetings of the various sections were held, but there will not be space to consider these in detail. Three symposiums took place in the section of medicine on acute poliomyelitis; in the section of obstetrics and gynecology on temperature in the puerperium; and in the section of preventive medicine on typhoid fever and water-supplies. At the latter some really very useful and instructive papers were read, and the discussion thereon brought out one or two points of exceptional interest. For example, Dr. Starkey, Professor of Hygiene at McGill University, has argued for some time that in most, if not in all, epidemics of typhoid, the typhoid-like infections, those which do not react to the Widal test, are largely in evidence, and that these should be watched carefully in order that the disease is not spread by their agency. This view of the situation was accepted by the majority of those present. A lucid description was given by Major Lorne Drum, of Ottawa, of the recent epidemic of typhoid fever there; and further proof was given, if such proof be needed, of how an epidemic may be spread by a contaminated water-supply.

On Thursday afternoon, June 8th, a general meeting was held at which the President's address, the address in Surgery, and an address on Cholelithiasis were given. Unfortunately the President was not well enough to attend the meeting, and in his absence his address was read by Dr. A. Hutchinson, of Montreal. Dr. Armstrong reviewed the history of the origin and development of the Canadian Medical Association, and paid tribute to the high standard of education and ethics of the medical profession in Canada. The Roddick Bill for Dominion Registration was then discussed, and the hope was expressed that with the adoption of the act the Councils of the English-speaking provinces would unite on a uniform standard of matriculation. The new President was especially emphatic with regard to the great value of medical research, and pointed out that it was on the basis of research for commercial purposes that the progress of Germany was built to-day.

Dr. A. Primrose, of Toronto, gave the address in Surgery, and said in part that Canada being a young country, something of the spirit of the pioneer settlers has been inherited, and Canadian medical men are more ready to develop along lines which may be new and revolutionary in character. The consequences of this willingness to learn have been that nowhere is work done in surgery with more uniform efficiency than can be found in the hospitals of Canada to-day. The greater part of Dr. Primrose's able address was taken up with a consideration of Lister and his work, and with a plea for a more open mind with respect to discoveries and new work in medical and surgical science. While acknowledging that conservatism in surgery is good, the speaker deprecated, as not infrequently happens, prejudice masking in the guise of conservatism.

The next paper was contributed by Dr. W. J. Mayo on a subject with which he and his brother are intimately versed, that of the surgical treatment of gall-stones. Dr. Mayo said in reviewing 4,000 operations performed by the brothers Mayo upon the gall-bladder and biliary passages, he had been impressed with the fact that the mortality was due to the complications incident to the disease, rather than to the removal of gall-stones from the otherwise normal gall-bladder. While complications were to be feared, the gall-stones themselves were responsible for them. It was in the early period that operation furnished an easy, safe, and efficient cure. Cholecystostomy with temporary drainage of the gall-bladder to the surface was the operation preferred, because it saved this valuable organ for future function. The danger of re-formation of gall-stones after cholecystostomy was exceedingly small. In the Mayo brothers' series they observed but three cases in which stones had re-formed in the gall-bladder, and it was probable that in the majority of supposed re-formation of gall-stones, the stones had not re-formed but were incompletely removed at the primary operation; an accident which does not often happen when the operation is done early.

In the 4,000 operations the average mortality was 2.75 per cent. In 2,920, the disease was local and confined to the gall-bladder and cystic duct. The operative mortality was 1.6 per cent. In 2,165 of these, cystectomy was performed, with a mortality of 1.5 per cent. In 755 cases, cystectomy was performed with a mortality of 2.4 per cent. In 492 cases in which the common duct was involved there was an average mortality of 8 per cent.; a mortality which depended not so much upon the operation itself as upon the extent of involvement of the liver and pancreas, and the bad general condition of the patient. Pancreatitis as a complication occurred 359 times in the 4,000 cases.

A particularly pleasing feature of the meeting was the presentation of a bound illuminated copy of the first issue of the Journal of the Association to Dr. MacPhail, its gifted editor, for his energy and zeal in assisting to establish the publication. Perhaps the event of the meeting most looked forward to was the delivery of the address in Medicine by Sir James Barr, of Liverpool, England. Sir James has made for himself a reputation not only for his medical knowledge, but for his ability as a racy, witty, or rather pawky and effective speaker. Sir James certainly did not belie his reputation, but spoke up to it with the utmost vim. The speech was a hard-hitting one, in which he tilted vigorously against many of the abuses of the day. The giving of the address was made the occasion of a social function. It was given in the gallery of the Art Association of Montreal, and was preceded by an instrumental concert and followed by a reception. There was a brilliant audience, including

a large number of ladies. The title of the address was "Preventive Medicine, the Medicine of the Future." Sir James Barr gave it as his opinion, that the hope of the human race lies in the physician, and that, as the majority of diseases are preventable if the public were alive to their own interests, they would pay medical men liberally for directing them in the paths of truth and in the ways of health rather than for treating their diseases. He further holds the view that so far as preventive medicine is concerned, very little can be placed to the surgeon's credit. About the only diseases which they attempt to prevent are those which spoil their operations—erysipelas, pyemia, and septicemia. On the question of heredity and disease his views are not quite in accord with those of the majority of the medical profession. Quoting from a speech made recently by Dr. Osler in Dublin, to the effect that it is a matter of common knowledge that consumption is not hereditary, Sir James retorts: "We know nothing of the kind, although we are having it constantly dinned into our ears by medical men who ought to know better." He is greatly concerned at the multiplication of degenerates in cities, and thinks that the manner in which useless lives are saved nowadays is bad for the future of the race. He points out that those countries, which have to a large extent suspended a selective death-rate, but have not been wise enough to establish a selective birth-rate, are certain to decay. Sir James seems somewhat a believer in the principle of the survival of the fittest. At any rate, he strongly holds that propagation of the unfit should be controlled, and especially of the insane and mentally deficient. In conclusion he said that he was not now so much concerned with the prolongation of life as with the preservation of health. Medical men were not concerned with any useless attainment of longevity, but with the prolongation, together with the efficiency of life. When a life ceased to be efficient, it should retire into obscurity, be withdrawn from circulation, or receive an old age pension.

June 15th.

PARIS LETTER.

ORGANOTHERAPY IN CARDIAC COMPLICATIONS OF INFECTIOUS DISEASES.

By AUGUSTE A. HOUSQUAINS, M. D.

The French authors who have done epochal work in connection with the cardiopathies are Sénac, who in 1749 published a very remarkable treatise for that epoch on diseases of the heart, Corvisart, Bouillaud, Duroziez, Merklen, Huchard and Potain. Without belittling the importance of the work of Corrigan, Stokes, Traube, it can be said in all justice that diseases of the heart have engaged the attention of French physicians uninterruptedly, and the result has been a large number of articles. The clinical features, the anatomo-pathology, and finally the study of the pulse by the graphic method (Marey and François-Franck) have in turn occupied the thought of the French investigators. But better than all this, the recent investigations have established new methods of

diagnosis in cardiac diseases: the phlebograph, which has been perfected, the esophagocardiograph and electrocardiograph.

The far-reaching discovery of His's bundle has resulted in the further study of arrhythmias. Physiology, anatomy, and the anatomo-clinical method have been instrumental in establishing the primordial rôle played by this fasciculus of fibres in the production of the cardiac rhythm and the fact that its lesions engender divers arrhythmias. It cannot be denied that it would be an exaggeration to say that all arrhythmias are due to alterations in His's bundle; but without doubt the part which the nervous system plays in these disturbances should not be overlooked when studying the pathogenesis of a certain number of them. By assuming this to be a fact, new horizons in regard to cardiac pathology have been opened up and much can be expected in the future from further studies.

But within the limitations of this letter it would be foolhardy to attempt a complete description of this vast subject by mentioning all the recent acquisitions in the matter of diseases of the heart. I shall limit myself to the examination of one important phase, based on the study of the functions of the ductless glands and which has thrown considerable light on the nature of the cardio-vascular complications which are seen in the course of, or following infectious diseases.

The cardiac forms of infectious diseases, such as typhoid fever, scarlatina, or diphtheria, are, as one knows, characterized by a cardio-vascular syndrome, the prognosis of which is generally grave since death often supervenes, whether from syncope or from collapse.

What is the pathogenesis of these unfortunate accidents? It has been proposed to explain them on account of the presence of a myocarditis. This explanation, plausible in certain cases, is not satisfactory in all, and it is necessary, as we shall later on see, to study certain functions of the vascular glands so as to enlighten us as to the real cause of the larger number of these accidents.

It is hardly necessary to recall the clinical picture of these cardio-vascular disturbances. At any time during the disease, but principally at the end of the acute attack, one may observe the patient confined to his bed, prostrated, without any strength, the skin pale and cold, and covered with perspiration, the extremities more or less cyanosed.

The pulse is rapid, irregular at times, filiform, arrhythmical. On auscultation the heart-sounds are muffled, sometimes there is a bruit. On palpating the precordial region the apex cannot be made out, but at most a sort of vague undulation. The arterial tension is very much lowered, and the tendency to syncope is extreme; the patient suffers from nausea, and from diarrhea. Sudden death may supervene from the slightest change in position. These complications have not always the same intensity nor are they of the same frequency in the infections.

If one remembers that the therapy follows logically the pathogenic idea of these diseases, one readily understands why researches have been made as to the causes of the cardio-vascular disturbances which are seen in the course of infectious diseases. Since the time when Louis gave us his idea of myocarditis, this lesion has been the object of the closest study, but though we are convinced that if toxi-infectious myocarditis explains a number of the cardiac accidents observed in the course of diseases such as typhoid fever, scarlatina, diphtheria, it nevertheless does not explain the cases in which, in spite of the undeniable cardio-vascular disturbances, the autopsy shows a heart apparently normal. Latterly, investigators have attributed the cause of these cardiac disturbances to

the central nervous system, the nerves and the ganglions of the heart. But isolated facts are insufficient to support this theory, since in all cases the interpretation is purely speculative and therapeutic application is without any results. However, this does not obtain as regards the most recent causative factor—namely, alterations in the suprarenal capsules. The new conception attributes the cardiac complications in infectious diseases to insufficient function of these capsules.

On what basis does this theory repose? We know for certain, and the researches of Loeper and Oppenheim have demonstrated this experimentally with animals, that all the infections, no matter of what nature, show on the surface of the suprarenal capsules alterations more or less profound according as the infection is more or less intense. Autopsies have demonstrated that the same obtains in man. The important question in this matter is to ascertain whether all, who die from infectious diseases complicated by cardiac disturbances, show post-mortem alterations in the suprarenal capsules. A case published by Sergent, in which he describes the syndrome of an acute suprarenal insufficiency, is most characteristic. Sergent found, at the autopsy of a patient who had had pneumonia and died on the fourth day, the suprarenal capsules profoundly altered, congested and hemorrhagic. It is necessary to mention here the case published three years ago by Hutinel, of a young girl at whose autopsy there was revealed an acute inflammatory state of the suprarenal capsules; the patient having died as the result of convulsions with cyanosis and extreme depression in the course of bronchopneumonia.

Is it not striking to what extent the cardiac symptoms in infections resemble the syndrome of suprarenal insufficiency? We note in the latter, in divers degrees, the salient features described by Sergent and Bernard; that is to say, lumbar and abdominal pains, anorexia, vomiting, diarrhea, weakness, prostration with hyperthermia, thread-like pulse, and the tendency to collapse. As to the frequency of death, we know to-day how often it occurs in suprarenal insufficiency. According to Hutinel there is a brown discoloration of the skin; but so rapid is the evolution of the various phenomena that this symptom has not time to develop in the majority of cases.

The arguments in favor of therapeutics based on the same ideas are not less convincing. We are aware of the gravity of the prognosis in infectious maladies with cardiac complications, and of the unexpected results suprarenal therapy has yielded in certain cases. Martin and Darré, Méry, Weil, Hallé have cited instances in which intense cardio-arterial complications have disappeared rapidly under the influence of suprarenal organotherapy. The employment of adrenalin has, in analogous cases, been attended by a remarkable therapeutic success in the hands of Netter, Josué, Moizard and Courby. All these authorities are in accord as to the rapidity of the amelioration affected by suprarenal organotherapy, whereas the same agreement does not obtain with other preparations. According to Renon and Armand Delille, the pituitary body plays an equally important rôle in the production of the toxi-infectious cardiac syndrome; which is not at all improbable, since we know the action of the hypophysis cerebri in regulating the arterial tension.

Hence, though we cannot furnish proof direct of what has been just stated, we nevertheless have in our possession a large number of presumptions of weight, which indicate that the suprarenal capsule is no negligible factor in the causation of those cardio-arterial complications which may be observed in the course of infectious diseases. In all cases

the value of the suprarenal capsule as a therapeutic agent is such that its use is indicated in the treatment of these grave disturbances.

Organotherapy should not be substituted for all the classical methods usually employed in the treatment of the cardio-pulmonary complications in infectious diseases, but it should occupy an important place in the therapy to which the practitioners of to-day resort. It is well in its way to order complete quiet for a patient; the ingestion of small quantities of milk; cardiac medicines and stimulants for the nervous system; but though all this is closely followed we should not fail to employ organotherapy directly cardiac complications set in.

Either adrenalin or the extract of the entire gland may be used. At the present time, preference is given to the latter. The total suprarenal extract is less dangerous and does not provoke, as Loeper has demonstrated as regards adrenalin, atheromatous lesions of the aorta; again it is easy to handle; and finally its action is more complete than adrenalin which contains only the active principle of the gland. On the other hand, in urgent cases with imminent syncope, when we require an immediate effect, we can have recourse to the intravenous and subcutaneous injections of adrenalin. Is it necessary to employ hypophysial organotherapy in conjunction with suprarenal organotherapy? This question has not as yet been satisfactorily answered, but it would seem that in certain cases this association is useful.

Suprarenal organotherapy in cardiac complications of infectious diseases is no longer a theory but a fact of undoubted value; not only has it diminished the gravity of the prognosis, but it holds out a hope which other modes of treatment do not.

June 10th.

DIAGNOSTIC AND THERAPEUTIC NOTES.

A NEW METHOD OF DETERMINING THE FREE HYDROCHLORIC ACID IN STOMACH CONTENTS.—Holmgren (*Deutsch. med. Wochenschr.*, No. 6, 1911). Holmgren has devised an extremely ingenious and simple method for determining the percentage of free hydrochloric acid in the stomach contents. It is based upon the observation, that when a little dilute acid is dropped upon filter-paper, the water penetrates farther into the meshes of the paper than the acid. A round wet area results, the central portion of which is acid, while the periphery, which consists merely of water, is neutral in reaction. The less the degree of acidity of the solution, the smaller will be the central portion of the wet spot that has an acid reaction as compared with the total diameter of the moist area. The apparatus consists of a rubber stamp which prints a series of dots one millimeter apart, a one per cent. solution of congo red and a block of filter-paper. The stamp is moistened with the congo red solution and pressed upon a sheet of filter-paper, printing upon it a line of red spots one millimeter apart. A few drops of the stomach contents are then placed on one of these spots and the paper laid aside until the fluid has ceased to spread. If the stomach contents contains free hydrochloric acid, a certain number of the red spots will have been turned blue, whereas others nearer the edge of the moist area will be wet, but will have retained their original red color. A comparison of the number of blue spots with the total number of wet spots enables one to estimate, by means of special table, the percentage of free hydrochloric acid. The advantages of the method, besides its simplicity, reside in the small amount of stomach contents required and its applicability at the bedside.

THE THERAPY OF ACIDOSIS.—Lichtwitz (*Therap. Monatsh.*, 1911; No. 2). Sodium citrate, which Boas considers the best antacid in hyperacidity, is recommended by Lichtwitz in the acidosis of diabetes mellitus. It is oxidized in the organism to sodium bicarbonate, and thus has the same power of combating acidosis as the latter, to which however it is superior in that it is more easily borne in large quantities by the stomach, and in that its smaller degree of alkalinity more readily permits of its use hypodermically.

A NEW SIGN IN HEMOPHILIA.—Frugoni and Giugni (*Sem. Méd.*, 1911, No. 3). If the arm or leg of a patient with hemophilia be constricted, as is done for instance in the determination of the blood-pressure, by means of a Riva-Rocci arm-band, subcutaneous hemorrhages will occur in the congested area. The intensity of this phenomenon varies with the

severity of the affection, but will be found present even when the hemophilia is not manifesting itself otherwise. Diseases, accompanied by a temporary hemophilia, show this tendency to the production of petechiæ only so long as the tendency to bleeding persists.

HORMONAL IN CHRONIC CONSTIPATION AND PARALYTIC ILEUS.—Krauert (*Muench. Med. Wochenschr.*, 1911, No. 17). Hormonal is the trade name of the peristalsis hormone discovered by Zuelzner. It is a chemical substance which occurs in all the organs of the body, but especially in the spleen, and which exercises a specific stimulus upon the peristalsis of the intestine. It is administered by deep injection into the gluteal muscles in an average dose of 15 c.c. Zuelzner, Henle, and Saar have reported observations with this drug, that are almost incredible: a single injection being followed by permanent cure of obstinate chronic constipation. Some of these observations have been chronicled in these columns. Krauert's results are equally striking. In 5 out of 9 cases of chronic constipation, a positive result was observed. On 2 of these the effect was apparently permanent, the chronic constipation disappearing completely, so that the patients felt as if "born anew." In the other 3 cases a temporary effect only was obtained, but in them the constipation was produced by an organic lesion.

The most striking results were obtained in 7 cases of post-operative paralytic ileus, which had resisted the ordinary methods of treatment. In all of them a prompt cure followed a single intravenous injection of hormonal. It is in this group of cases that the true field of usefulness of hormonal will probably be found.

A NEW METHOD OF PERCUSSION.—Wenzel (*Zentralblatt fuer innere Medizin*, 1911, No. 10). The percussion of the pulmonary apices can be rendered more delicate by anything that tends to render the lung resonance duller. Slight differences in the resonance on percussion of the supra- and infraclavicular fossæ become more marked if the patient stands with his bare back pressed firmly but not uncomfortably against a wall. Wenzel has found this method, which he calls "wall percussion" (*Wand-perkussion*) useful in the early diagnosis of tuberculosis.

THE DIAGNOSIS OF BEGINNING AORTIC SCLEROSIS.—Kukowerow (*Russky Wratch*, 1910, No. 51; abstr. in *Muench. Med. Wochenschr.*, 1911, No. 17). Several years ago Ssirotinin observed that in many people, if they stand erect with both arms raised, a systolic murmur is audible in the right second intercostal space; whereas, if the arms are allowed to drop only the normal cardiac sounds can be heard. This murmur, which usually has a blowing or scraping character, usually replaces the first sound immediately after raising the arms; sometimes, however, only after an interval of several seconds. Further investigation has shown that this murmur arises in the aorta and indicates a sclerosis of the por-

tion of the aorta nearest the heart. It is found chiefly in elderly individuals who complain of anginal pains. Kukowerow examined 2,173 patients with special reference to this sign and found it present in 164. It occurs chiefly in individuals in whom there is reason to suspect beginning arteriosclerosis, especially in those who eat excessively of meat, who smoke too much, and who are subjected to great nervous strain. Its diagnostic significance is the same as that of the ordinary systolic murmur characteristic of aortic sclerosis; in many cases, however, the murmur described above occurs earlier and characterizes an earlier stage of the disease. It has also a prognostic value in that its disappearance, as a result of treatment, must be interpreted as a favorable sign.

BOOK REVIEWS.

FOOD AND FEEDING IN HEALTH AND DISEASE. A manual of Practical Dietetics. By Chalmers Watson, M. D., F. R. C. P. E. Assistant Physician, Royal Infirmary, Edinburgh, Editor of the "Encyclopedia Medica." London: Oliver and Boyd. 1910. Price, 10/6.

The book has been written with the needs of the practising physician constantly in view. A few brief chapters, in the beginning, are devoted to some elementary consideration in the physiology of digestion, and the following chapters to a discussion of the various food-stuffs, chemical compositions, digestibility and, especially, the various forms in which each food may enter into the dietary, with directions for preparing the various dishes. The reviewer believes that the incorporation, as it were, of a cook-book with a book on dietetics is a most excellent plan. The physician so often hears from his patient, "I can't take eggs," or some other food; whereupon the physician drops that article from the prescribed list. In the great majority of cases the real truth of the patient's statement amounts to this: he cannot take this or that food in the form in which it has been customarily prepared for him. If the doctor were sufficiently acquainted with the technique of the kitchen, he would very rarely, indeed, be obliged to strike from his prescribed dietary a food which he believes necessary. It is therefore very gratifying to see in a book of this kind not only the general and theoretic considerations in the preparation of the various foods, but along with these a large number of well-selected recipes in cook-book form.

The author takes a rather one-sided stand on the question of alcohol. However, it must be remembered that he has seen this article abused more frequently than his American confrères. A large part of this book is devoted to a consideration of the dietary in various diseased conditions—typhoid fever, gastric ulcer, obesity, neurasthenia, etc. Here again there is a satisfying combination of theoretic considerations with definite working plans. For example, the Weir Mitchell treatment in neurasthenia is described in detail week by week, with directions as to massage, rest in bed with the amount and kind of food, and frequency of feeding set forth in a Daily Diet Sheet. The last fifty pages of the book, containing a number of the author's published observations on the effects of certain foods in animal feeding, might well have been omitted from a work of this kind. On the whole, the book is a most excellent work for the practitioner on a subject which has been and is most woefully neglected.

MENTAL SYMPTOMS OF BRAIN DISEASE. An aid to the Surgical Treatment of Insanity, Due to Injury, Hemorrhage, Tumours, and other Circumscribed Lesions of the Brain. By Bernard Hollander, M. D., With Preface by Dr. Jul. Morel, Late Belgian State Commissioner in Lunacy. New York: Rebman Company. Price, Cloth, \$2.00.

Hollander has collected in his book on "Mental Symptoms of Brain Disease" practically all the cases in the literature in which symptoms of insanity have formed or been complications of brain injury, such as hemorrhages, tumors and other circumscribed lesions of the brain.

The remedy suggested, naturally, for most of these cases is surgical treatment, and in a sense this book of Hollander's might be regarded as an effort to give to surgery its proper place in the treatment of acquired insanity.

The book is divided into a number of chapters, devoted to the lesions in the various lobes of the brain; each of these divisions is illustrated by references from the literature. Naturally, no serious criticisms may be made of a book of this kind; the only thing that can be asked is that the references from the literature should be done with accuracy.

As a compilation of facts, dealing with its subject, Hollander's work should be regarded as praiseworthy. As a contribution to the actual subject of mental

symptoms of brain disease, Hollander's book can find no place, for the reason that his literature references bear date, some of them twenty-five or thirty years old. Naturally, clinical observations made so long ago as that are open to serious criticism.

Morel, in his preface to this book, calls Hollander a scientific explorer, and we may add that as an explorer of the past Hollander may be given a place. Great credit must be given him for his industry, and particularly for the modest way in which his conclusions are stated.

The book is recommended as an interesting, and, perhaps, valuable collection of past histories.

INEBRIETY—A Clinical Treatise on the Etiology, Symptomatology, Neurosis, Psychosis and Treatment and the Medico-Legal Relations. By T. D. Crothers, M. D., Superintendent Walnut Lodge Hospital, Hartford, Conn. Cincinnati: Harvey Publishing Company. 1911.

This book, written by one whose chief prejudices are concerned with alcoholism, is full of facts and conclusions which are tinged by onesided thinking. As a work of special pleading, it stands, perhaps, among the first on this subject.

The reader is forewarned that no scientific or objective study of the influence that alcohol exerts on the human organism is here to be found. With this position admitted, the contents of Crother's book may be of considerable value.

As an effort to consider carefully the question of alcohol from the point of view of medical science, the book finds no serious place.

A word might be said in regard to the style or, rather, the lack of it, in which this book is written. There is a certain curious, emotional tinge to many of the paragraphs incident to a discussion of the aspects of the question, which should have no place in a study of this kind.

In general, it might be said, that there is contained in this book a great deal of material that would be valuable if it were placed before the reader in a form more in line with the right kind of medical thinking. The author's wide experience might have furnished facts of unusual clinical interest, which would have enriched the subject if he had been inspired less by the fact that he is a kind of medical missionary on the question of alcohol than the author of a work, which aims to consider in a serious way the influence of alcohol upon the human organism.

As it is, Crother's book remains an exaggerated plea of one who is considerably overpowered by his subject.

OUTLINES OF PSYCHIATRY. By William A. White, M. D., Superintendent Government Hospital for the Insane, Washington, D. C., Third Edition, New York, The Journal of Nervous and Mental Disease Publishing Company, 1911, Nervous and Mental Disease Monograph, Series No. 1.

The fact that White's "Outlines of Psychiatry" should have reached the third edition is sufficient evidence that it has met a demand among students and practitioners. The third edition has, for the most part, been changed only by elaborating some of the chapters; no fundamental differences are to be noted from the earlier editions.

As a textbook for students, White's "Psychiatry" can be recommended with considerable enthusiasm. It is well and clearly written, and avoids for the most part the moot points in psychiatry which are apt to be stumbling blocks to the immature student. While the description of the disease-types is good, as has been said, and clearly state the necessary information, it is questionable whether the student, or even the general practitioner of medicine, can derive a clear picture from the text; and the reason is that no attempt is made to describe clinically, by actual case-histories, types of disease.

A word of objection to the long introduction might be here submitted. Of 265 pages, 112 are devoted to Methods of Examination, Symptomatology, Treatment, Classification, etc. Certainly, this seems a curious overbalance for a book destined for the general reader.

Notwithstanding these criticisms, White's "Psychiatry" remains to-day probably the best short treatise in English on the subject, and, as a representative in English of the Kraepelin school, it deserves the high regard in which it is held by the general medical reader.

HANDBOOK OF DISEASES OF THE EYE. A Textbook for Students and Practitioners. By Harry Caldwell Parker, M. D., Clinical Professor of Ophthalmology, Indiana University School of Medicine, Indianapolis, Ind. Illustrated with 115 text engravings, a half-tone frontispiece and five full-page chromo-lithographic plates, with 26 figures. Philadelphia: F. A. Davis Co, 1910. Price, \$2.00.

An addition to the already large number of manuals on ophthalmology should justify its existence by originality and authoritative utterance upon the most important parts of ophthalmic practice. Accepting such manuals as May's or Veasey's as standard, the present booklet suffers by comparison. The division by chapters is that usually adopted. In addition certain topics are introduced which are not ordinarily found in the manuals, as for instance, the tests for tuberculosis, and the relation of the eye to the nose. The book is written with a certain irritating cock-sureness and in a style that is frequently loose, and in places decidedly ungrammatical. In the chapter on refraction, the author outlines an excellent method with astigmatic charts which he describes as his own invention, but which are, in fact, only slight modifications of the well-known and deservedly popular charts of Verhoeff. The modification of chart 2 was actually suggested by the reviewer in a paper written in 1907.

FOOD AND THE PRINCIPLES OF DIETETICS.—By Robert Hutchinson, M. D., Edin., F. R. C. P., Physician to the London Hospital; Physician in Charge of Out-Patients to the Hospital for Sick Children, Great Ormond Street; Author of "Lecturers on Diseases of Children," "Patent Foods and Patent Medicines," "Applied Physiology," Joint-Author of "Clinical Methods." With plates and diagrams. Third Edition. New York: William Wood & Co. 1911. Price, \$3.00.

This work is more of a consideration of food than of dietetics; hence it is a less satisfactory rejoinder to the "almost total neglect of the subject of dietetics" than would be some other work which keeps constantly in mind the immediate needs of the practitioner. For one, however, who wishes full and complete discussions of the various food-stuffs, their chemical composition, calorific value, digestibility, assimilability, etc., this work offers abundant information. Much space has been devoted to patent and proprietary foods; too much, the reviewer thinks, in view of the perplexing rapidity with which they multiply and the distinctly commercial manner in which many of them are exploited. An excellent chapter on the cooking of foods is deserving of special mention.

GOLDEN RULES OF REFRACTION. By Ernest E. Maddox, M. D., F. R. C. S. Ed., Oph. Surg. Royal Victoria Hospital, Bournemouth; Late Assistant Ophth. Surg. Royal Infirmary, Edinburgh; and Syme Surgery Fellow, Edinburgh University. "Golden Rules" Series, No. XII. Third edition. Revised. Bristol: John Wright & Sons, Ltd. Price, 1 s.

It is really extraordinary how much trustworthy information of a practical nature has been included within the confines of this little vest-pocket book of ninety-six pages. Dr. Maddox has picked out the salient points of the art of refraction and set them down clearly and tersely. The booklet will be found highly useful to the beginner in refraction and suggestive to the more advanced student.

GOLDEN RULES OF OPHTHALMIC PRACTICE. By Gustavus Hartridge, F. R. C. S., Senior Surgeon Royal Westminster Ophth. Hosp.; Ophthalmic Surgeon and Lecturer on Ophthalmology, Westminster Hospital. "Golden Rules" Series, No. VII. Fifth Edition. Bristol: John Wright & Sons, Ltd. Price 1 s.

This tiny book of seventy-two pages contains a great number of practical hints to the beginner in ophthalmic practice. Its teaching is sound and in accord with modern ophthalmic concepts.

BOOKS RECEIVED.

PHILOSOPHIES. By Ronald Ross, F. R. C. S., D.Sc., LL.D., F. R. S., C. B. London: John Murray. Price, 1 s.

EDUCATION AND PREVENTIVE MEDICINE. By Norman Edward Ditman, Ph.D., M. D. New York: The Columbia University Press. 1911. Price, 25c.

VICIOUS CIRCLES IN DISEASE. By Jamieson B. Hurry, M. A., M. D. (Cantab.), Ex-President, Reading Pathological Society. With illustrations. London: J. & A. Churchill. 1911. Price, 6 s.

THE HOUSE FLY—DISEASE CARRIER. An Account of Its Dangerous Activities and of the Means of Destroying It. By L. O. Howard, Ph.D. New York: Frederick A. Stokes Co. Price, \$1.60.

"606" IN THEORY AND PRACTICE. By Geheimrat Professor Dr. Paul Ehrlich and J. E. R. McDonagh, F. R. C. S., Surgeon to Out-Patients, London Lock Hospitals. New York: Oxford University Press. 1911.

PRECIS D'ELECTROTHERAPIE ET DE RADIOTHERAPIE OCULAIRES. Par le Dr. A. Leprince (De Bourges). Avec 33 figures dans le texte. Paris: Librairie Médicale et Scientifique, Jules Rousset. 1911. Price, fr. 3.50.

GRUNDLAGEN UND ERFOLGE DER CHEMOTHERAPIE. Von Professor Dr. Paul Ehrlich, Geh. Obermedizinalrat, Direktor des Kgl. Instituts fuer Experimentelle Therapie in Frankfurt a. M. Mit 13 Tafelabbildungen. Stuttgart: Ferdinand Enke. 1911.

HAY FEVER AND PAROXYSMAL SNEEZING. (Vasomotor Rhinitis.) By Eugene S. Yonge, M. D. (Edin.), Physician to the Manchester Hospital for Consumptives and Diseases of the Throat. With two coloured plates. Edinburgh and London: William Green and Sons. 1910.

MANUEL PRATIQUE DE LA LITHOTRIE. Par F. Cathelin, Chirurgien en Chef de L'Hopital D'Urologie, Ancien Chef de Clinique et Lauréat de la Faculté de Médecine de Paris. Service du Professor Guyon. Avec 145 figures dans le texte. Paris: Vigot Frères. 1911. Price, 4 fr.

JOINT TUBERCULOSIS. By Leonard W. Ely, M. D., Consulting Orthopaedist to the County Hospital; Attending Orthopaedist to the Children's Hospital, Denver, Colo.; Member of the American Orthopaedic Association, etc. Illustrated. New York: William Wood & Co. 1911. Price, \$2.50.

GOLDEN RULES OF OPHTHALMIC PRACTICE. By Gustavus Hartridge, F. R. C. S., Senior Surgeon Royal Westminster Ophth. Hosp.; Ophthalmic Surgeon and Lecturer on Ophthalmology, Westminster Hospital. "Golden Rules" Series, No. VIII. Fifth Edition. Bristol: John Wright & Sons, Ltd. Price, 1 s.

DISLOCATIONS AND JOINT FRACTURES. By Frederick J. Cotton, A. M., M. D., First Assistant Surgeon to the Boston City Hospital; Assistant Professor of Clinical Surgery in Tufts College Medical School, Boston. With 1201 illustrations. 830 drawings by the author. Philadelphia: W. B. Saunders Co. 1910. Price, \$7.50.

MENTAL MECHANISMS. By William A. White, M. D., Author of "Outlines of Psychiatry"; Superintendent Government Hospital for the Insane, Washington, D. C.; Professor of Nervous and Mental Diseases, Georgetown University, Washington, D. C., etc. New York: The Journal of Nervous and Mental Disease Publishing Co. 1911.

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EDITORIAL.

THE NEWER EDUCATION FOR CHILDREN.

Assuredly, as Ellen Key has written, this is "the century of the child"; and if any other subject has received greater attention in these latter days, the matter has escaped us. On all sides we hear that most, if not all, of our ideas in the upbringing of the child have been wrong and that the times are ripe to remedy our past neglect. That the period is with us now, to accomplish what all the reformers would desire, may be open to doubt; but what is clearly written across the thought of the day is that even a small beginning would be better than our present apathy. And apathy it is that has been in control of our attitude toward the child; not the apathy which arises from a studied indifference, but the sort that always accompanies routine thinking. But we are awaking, and if the results in the next few years justify the revolutionary course pursued by the most radical element in the educational camp, great regret will be expressed by all that the older methods of education were allowed to last as long as they did.

If the reader of these lines is at all interested in the subject, we would refer him to Dr. Boris Sidis' address, "Philistine and Genius," which was delivered before the Harvard Summer School, August, 1909, and to Mr. H. Addington Bruce's article, "New Ideas in Child Training," in the *American Magazine* for July. Both these essays are on the same lines and make plain to the reader that the child of tender years, say three, is a thinking animal, and that it is just as easy for it to learn Greek or Latin as it is for it to master its own language. At first glance, this sort of reasoning might appear ridiculous, but the tests which have been made by Dr. Sidis, Professor Leo Wiener and Rev. A. A. Berle in their own families must discountenance so superficial a view. True, none of the

children have as yet reached their majority so as to prove beyond a doubt that this so-called over-education has not undermined their physical and mental beings. But from what is in evidence to-day—their ages vary from nine to sixteen—no deleterious effects are perceptible. Certainly the absence of any drawbacks is not at all surprising when the methods, as set forth by these pioneers in the field of education, are closely studied.

To anyone, who will take the trouble to study our present public-school system even in a cursory manner, the thought must strike him that as a system it may have its good points, but as a means for educating divers minds of manifold shadings it is a failure. Mr. Gradgrind, as pictured by Dickens, was also enamored of a system, and though when we read of him in "Hard Times" our risibles are never quiet so great is our enjoyment, we somehow forget that in this world of ours to-day it is system in all things that makes its strongest appeal to man. This can be very easily explained on the ground that a system, when once evolved by an educator, a manager of a department store or an overseer of a factory, simplifies matters greatly, for by compelling those under him to work within its limits or incur his displeasure, he relieves himself of a multiplicity of irritating matters, which, if recurring daily, would doubtless rob him of a large share of his content. But the ease which comes to him through his undeviating methods does not affect those, who must obey, in a similar manner; for though in the instances in which there are adults to be disciplined the rebellious spirit may not be too evident, in the child, on the other hand, there is no denying its presence. And then what more natural than greater efforts to subdue recalcitrance until finally, as Dr. Sidis puts it, a condition is evolved in the child that can best be characterized as "sheepish submissiveness."

Now what has the newer note in education to offer us? In the first place, the process is started at a very early age, and instead of waiting for the educator to mow down the stubbles when the child is six so that the usual lessons may be learned, the parents devote their time to training its mind so that all lessons in after-years will be easy of comprehension. And no compulsion of the public-school order is used, but a persuasiveness which only a parent, who is interested in his child's mental growth, knows how to exercise. In short, if you teach a child how to concentrate its mind on one subject and not on a half dozen, as is done in our schools to-day, the results cannot but be gratifying. And as for the studies, can it be denied that the intricacies of Greek or Latin are more difficult to grasp than those of the English language, provided the child hears only Greek or Latin during certain hours of the day? We are prone to think our own language the simplest in the world because we acquire it naturally; but the plea of simplicity is wrong, though the natural manner in which

it is acquired cannot be gainsaid. And if partial mastery of one's native language can be attained at any early age, in a manner that is natural, is this not indicative enough that the mind of the child is not the barren soil we have allowed ourselves to believe it to be, just because we were too careless to think otherwise?

This matter of the closer relation of the parent and the child should interest all physicians; for have they not seen, in the past, the bad effects which have arisen from a dissociation that was ever widening? Not only in an educational sense, as is generally understood, will the *rap-prochement* bear fruit, but in that wider meaning of the word, which is inclusive of all those matters which bear on the moral and physical phases of life. And, if a better sort of manhood is effected, physicians should rejoice loudest, for at present are they not assailed daily by lay critics for not sounding a warning note in connection with all the foolish things doting parents do out of sheer love (?) for their children?

THE PHYSICIAN AND HIS HOBBIES.

A very interesting subject, indeed, is the perennial one and which might be formulated into this: Should a physician, who is keen on acquiring patients and a reputation among his confrères as an enthusiast of his work, divert his mind by indulging in one or more hobbies? While at first glance this question may strike the reader as easy of answer, since this must be in the positive, it would be well for him to use considerable forbearance before delivering his opinion. Cases have been on record, he will be told by some wiseacre, that undoubtedly show to what foolish lengths a hobby may drive an otherwise well-intentioned man, and how impossible it is, even in exceptional cases, to prevent its growing upon one until the nice balance between serious work and play is destroyed. These expressions, though lightly thought of by the person who has allowed himself to slip into the noose of a hobby, and imagines his happiness all-sufficient, are really remarks which should be carefully weighed; for they reflect the state of the society in which he lives. And since it is an incontrovertible fact that American society with all its good qualities is quite intolerant of the dilettante,—in fact, has a despicable opinion of him, it need not strike anyone as strange that the medical man of all men will find himself, directly it becomes known that he has leanings which are not medical, the target for a number of insinuating and ambiguous remarks which will be effective in injuring his reputation as a serious worker. Of course, if his desire is to tilt against public opinion, no matter what happens, the consequences, he should be told in advance,

will be bitter; for a defiant attitude cannot hope for any treatment less harsh than a complete ostracism.

As Laurence Sterne says: "They order this matter better in France"; and in substantiation of the applicability of this saying to what we have in mind two references should suffice. In the first place, there is the Paris Medical Orchestra, which is composed only of medical men and which gives concerts at intervals for charitable purposes. This organization would not call for comment if it were of the ordinary sort that is compelled to give performances behind closed doors, lest a police interference might be instituted by the musical critics; but the fact of its appearance in one of the largest halls and in the presence of a critical public that would not refrain from jeering, were discord evident in the slightest degree, speaks loudly for its excellence. And, secondly, the Salon des Médecins should give us even greater pause, since here is a better outlet for talent that may have been under cover for years on account of the lack of opportunity to develop it. This Salon exhibits only the works of physicians, and when we mention that at the last annual exhibit there were paintings and sculptures by such men as Labbé, Colin, Landolt, Sabouraud, Borrel, and others of equal prominence in the world of medicine, it is to indicate that this departure from their customary professional habits seems to fit in quite gracefully with their serious undertakings.

We have cited these two incidents of an agreeable nature in the life of the French physician to illustrate our point that a hobby can be prosecuted to its fullest extent without a blighting effect on one's vocation. And since the possibility of harm to the serious side of life can no longer be considered, would it not be feasible to introduce similar ideas into the life of the American physician? By "similar" we do not mean an apish imitation; rather do we mean the nurturing of any talent, no matter how small, until it blossoms forth into something that is above the ordinary.

In advocating diversions of the nature indicated above, we are prompted thereto by our observations of the average American physician's life. Though he may assert with heat that his is the completest, that all his moments are occupied, that diversions other than the playing of golf are unnecessary, he forgets that somehow he is overlooking a number of arid spots in his mental life, which a measure of philosophic thought on his part would not be long in calling to his attention and in a way that would make him wince. To prevent this regretful note and to add to the mental peace which we imagine is none too well developed in his busy career, some attention to what he can do naturally,—the furtherance of a predilection, possibly of an artistic nature, that has been lying dormant

through neglect,—may be effective in driving his overwrought mind into channels that will not only benefit him by adding to his joy of living, but be of considerable help to his fellow-men. But, as we said before, perhaps our civilization has not reached the point when this can be done without incurring the stigma of being inattentive to one's real work; though if this were so, why are we so lenient toward those physicians who relax alas! only too often in one direction: the direction that means the deluging of a patient public with popular books on such soul-slumbering subjects as our nerves, our morals and our stomachs!

A CITY HOSPITAL AND WHAT IT SHOULD STAND FOR.

The comments, which invariably arise when the proper conduct of a municipal institution is "on the carpet," are of so variegated a nature that to despair of mankind losing its powers of ingenuity, in the near or far future, is to imagine a mental state which has small probability of occurring. Opinions are so easily formulated and so readily bestowed on those who are willing to receive them, are so individualistic and so colored by some experience that was purely accidental, that they ought to be subjected to the fiercest light before acceptance is possible; and even then only a very small number should be retained whereon to erect the formulas without which no institution can hope to achieve the distinction of being managed according to humanitarian ideas. In case this is done, uniformity of opinion is approached; which is really a happy ending, since simplicity counts for much against a complexity that can only blind the well-intentioned to the real purposes of public institutions. And in all discussions, the purpose of an institution should not be lost sight of; for, if this is clearly outlined, warring opinions will have but a small chance to clog the wheels which should always be in action so that the welfare of the inmates is not hampered.

With these thoughts in mind, it would seem that the stewardship of an institution, that is dedicated to the sick poor or to those whose financial status is not exalted enough to allow them the luxury of one of our private institutions, would be as simple a matter as the uncomplicated arithmetical problem of two and two is four. But such is not the case, if we draw our conclusions from the rather untoward occurrences which invariably obtain when the question is to the fore as to what amount of money should be spent for its upkeep. These occurrences have a pettiness,—in fact, a meanness that does small credit to what we glibly talk about as "our enlightened age"; for can it be denied that, when wrangling of the sort that deteriorates into personalities is the key-note, there are

not overlooked many vital points which should have a better fate than complete submergence? And here it would be well to state that the City Hospital of St. Louis is no exception as a storm-area; for, if we have read its history aright, its progress along the lines which would do it the greatest credit has not been so illuminating a chapter that italics would be justified.

That money is absolutely necessary, if a house is to be kept in order, is a saying that has all the earmarks of a time-honored platitude; but, though one would think that this axiom would by now be part and parcel of human thinking, it is apparently too elusive to be drawn into controversies regarding the keeping of another's house. And surely the conditions which prevail in the City Hospital of St. Louis are such to-day that, in the bead-roll of similar institutions as they obtain in all our large cities, its rank would not be among the elect. We hold no brief for the Hospital Bill, nor are we completely won over by the statements that the amount of money which the city now expends should suffice for all needs; for ours, be it said here, is the attitude of the critic who has the ingenuousness of *Oliver Twist* when he could not grasp why his demand for more food was refused. This attitude is not one too greatly enamored of the debit and credit sides of the ledger, but it has this in its favor that, despite the absence of an enviable business sense, it breathes a higher humanity than can be taught by mere figures. Between economy and waste, as we know, an alliance is impossible; but it is surely a middle-class conception of the latter to be continually telling us of the disasters which follow in its wake. And even though there is some waste in municipal institutions, would it not be better to tolerate this than do what is now done in administering the affairs of the City Hospital of St. Louis; practise a niggardliness that is wholly out of place when brought to bear on an institution that was never meant for outcasts, but was intended for those lowly (?) elements in the community, who for explainable reasons cannot afford to spend their month's wages for a limited sojourn in a private hospital.

OPINION AND CRITICISM.

THE MEDICINE OF THE FUTURE.

Under the title of "Preventive Medicine: the Medicine of the Future," the hopeful reader expects to read a fairy-tale of the time when disease will no longer exist, when the efforts of therapeutists to cure disease will have been entirely obliterated by the work of the hygienists and bacteriologists in the prevention of disease. It is, therefore, a rather interesting, if unexpected, relief to find Sir James Barr, in a recent number of the *British Medical Journal*, discussing this subject from what must be called an heretic standpoint. He admits, of course, that prevention is better than cure, but he scoffs at certain accepted methods; for instance, he has collected a large series of statistics on the relation of tuberculosis to insanity, and he draws the conclusion from this that the world to-day is not yet ripe for the complete disappearance of the tubercle bacillus. To-day the tubercle bacillus is a sort of guardian angel over the proper development of the race; it kills off in large numbers insane patients, thereby reducing the death-rate from insanity, and preventing propagation of an insane people. In fact, "if you abolish the tubercle bacillus in Ireland it will certainly become a question of 'God save Ireland,' because if you do abolish the tubercle bacillus the insane and the defective-minded will go on multiplying until the race is a race of imbeciles."

It would not serve any purpose to go into detail on the rest of the argument. We will pick out a few sentences here and there. Of pneumonia he says, "The disease is short and inexpensive, so that no one makes much out of it except the undertakers, who grow fat on the misery of others. The case mortality is high, but yet no serious attempt has been made to curtail its incidence." In this sentence Sir James forgets that work is done in other countries besides England. In Germany and America a tremendous amount of work is being done on pneumonia, both from the standpoint of prophylaxis and of cure. Incidentally, he does mention the very valuable (?) pneumococcus vaccines in the prevention of pneumonia. He also speaks very strongly on the use of vaccines as an important part of preventive medicine in diseases in which certainly the present results do not warrant his statements.

A rather pleasant slur on his surgical colleagues follows: "About the only diseases which they attempt to prevent are those which spoil their operations—erysipelas, pyemia and septicemia. The surgeons largely

live on the failures of physicians and general practitioners." This may be true to a partial extent, but he forgets that Lord Lister was a surgeon, and that the practical application of the principles of bacteriology was made by surgical pioneers.

After reading other sentences of this sort, in which bronchitis, pleurisy, rheumatic fever, diseases of the blood-vessels, heart and kidneys, diseases of children, myositis ossificans, and congenital hypertrophic stenosis of the pylorus in infants are discussed, one is left with the decided impression that Sir James Barr believes the prevention of diseases will be accomplished by attention to the calcium metabolism, and by the more general use of vaccines. Americans will hardly agree that the bacillus coli vaccine is often useful in the treatment of appendicitis, or that the science of inorganic metabolism is by any means advanced far enough to consider calcium or potassium or sodium the disturbing factor in disease. But as an unusual contribution to the literature of the day, and as an interesting piece of insular humor, we can highly recommend a close perusal of Sir James' address.

THE AMERICAN NEUROLOGICAL ASSOCIATION ON EXPERT TESTIMONY.

There are numerous ways by which changes looking toward the betterment of present conditions may be brought about. New laws may be passed, publicity of present abuses may be exploited through the press, and efforts planned to create a better standard may be devised. Each and all of these agencies have been actively followed for some years in an effort to modify or change completely one of the greatest abuses of our medico-legal system,—that of expert testimony.

In spite of many attempts, much publicity and debate, this abuse, with a few notable exceptions, has remained very much as it was. Expert medical testimony is yet the primitive plaything of an *ex parte* legal contention, and the physician, whether by design or absolute helplessness, to say nothing of occasional cupidity, is caught in the meshes of an obsolete procedure. He is thus, consciously or not, prostituting the spirit of science, by shaping his knowledge or conclusions to fit a scheme of legal defense which is planned astutely to exaggerate, minimize or exclude facts, not according to their relative importance, but according to a preconceived plan of prosecution or defense. In short, his testimony is not directed to the discovery of facts and conclusions derived from them, based upon the study of a medical problem, but in support of or attack upon a legal theory devised to convict or free an individual accused of a crime.

The American Neurological Association, after carefully reviewing the subject of expert testimony, has set forth as its solution of the problem the following:—

1. That the methods of legal procedure in trials involving neurological testimony are inefficient, tedious and expensive; they fail to utilize effectively expert knowledge and skill and thus make it more difficult to secure justice.

2. That a fundamental reason for the criticisms of medical expert testimony lies in these faulty methods of the law, including the practice of building up cases, the misuse of the hypothetical question and the passing upon technical questions by juries.

3. That the judiciary should by legal enactment be allowed more latitude in enlightening the jury and enabling it to comprehend the nature and meaning of the medical testimony laid before it.

4. That we urge that the medical profession seriously endeavor to secure improvements in the lines indicated, chiefly and primarily in the interests of justice, and because expert testimony is necessary, is helpful to justice and ought to be freely and effectively used in the courts.

5. That whenever possible the medical witness should testify only after he has had an opportunity to make both a mental and physical examination of the person concerning whom the litigation is raised; and that equal rights should be accorded the medical witnesses for both the plaintiff and defendant in the examination of the person alleged to be ill or injured.

6. That we consider the hypothetical question as ordinarily presented to be unscientific, misleading and dangerous.

7. That we recommend as advisable the adoption wherever possible of the so-called "Leed's method" of preliminary consultation by medical witnesses on both sides of the case as to its status.

8. That we advocate a freer use of appointments of commissions by the court.

9. That a period of hospital or similar form of observation of persons whose nervous and mental conditions are mainly subjective, is the best method for securing impartial and accurate opinions; also that we advocate the enactment in every State of laws favoring such method.

10. That it is the sense of the Association that it is inadvisable and objectionable for any of its members to occupy the position of medical advisory counsel in open court and at the same time to act as expert witness in a medico-legal case.

11. That we regard the acceptance by a physician of a fee that is contingent upon the result of a medico-legal case as not in accordance with medical ethics and derogatory to the good repute of the profession, and advocate the regulation of the practice by legislation.

12. That we are in favor of action by medical organizations that will secure a definite standard of qualification for medical men giving expert testimony, such as the following: That a physician should not be considered a neurological expert of the first class, unless he is a graduate of a reputable medical college; has paid special attention to the subject of

neurology for at least six years; has had opportunities of laboratory and clinical study for at least four years, and is a member of some neurological society in good standing.

These resolutions were reported May 13th, 1911, at the recent meeting of the Association. They represent what appears to be the most careful thinking on the subject that has yet been given publicity.

LITERARY NOTE.

The one outstanding quality in Hans Kurella's "Cesare Lombroso: A Modern Man of Science" (Rebman Co.), which has been excellently translated from the German by Dr. M. Eden Paul, is that the reader gets a thorough insight into Lombroso the man,—his ambitions, his struggles for recognition despite prejudice and almost insurmountable obstacles, and his final triumphs. The pen-portrait of this remarkable man is an illuminating lesson to all those seekers of scientific truth, who might foolishly imagine that the road to success is barren of stubbles; for written across it in no mistakable letters is the warning that only by indomitable strength of mind can be overcome the bitter opposition which always follows unconventional thought close at heels. Viewing Lombroso's long life, the note we gather is not one that breathes of peace, but rather one of constant warring against adverse opinions of his studies in criminal anthropology and, especially, of his attack on spoilt maize as the cause of pellagra. The controversies in regard to the latter lasted some thirty years and were not unattended by acrimony; but in 1902 "official recognition was given to his theory by the legislation carried in that year for the prevention of the disease." But could the year 1902 wipe out the wrongs of 1872, when no less a person in the Italian medical world than Porta, Dean of the Medical Faculty of Pavia and a tool of the great landlords, arose in the Medical Academy of Milan directly after Lombroso explained "his experiments and investigations regarding the etiology of pellagra through the consumption of spoilt maize," and accused the investigator "of having artificially induced lesions in the animals he experimented on"? Needless to add that the majority present pinned their faith to Porta's insincere words, and that at the next carnival the pellagrous chicken was even a greater attraction than the most ludicrous harlequin.

ORIGINAL ARTICLES.

ON LESIONS OF THE MID-BRAIN, WITH SPECIAL REFERENCE TO THE BENEDICT SYNDROME.

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Direct experiment upon the structures of the central nervous system of man is necessarily limited, and the results of such experimentation upon lower animals, even those nearest to man, leave much to be desired from the standpoint of interpretation.

Disease, however, is a ruthless experimenter. Its technique knows no refinements, and when its field of operation involves the central nervous system the natural reparative processes do little to overcome the blunders of its workings. Hence the persistence of the defects, and the exasperating struggles in the attempt at therapeutic relief.

There are compensations, however, for the permanencies of disease of these structures make possible definite contributions to nervous physiology and anatomy, which are largely denied by the experimental path, although this latter mode of approach, as carried on in lower animals, rounds out the pictures offered by nature's experimenter, disease.

The mid-brain offers an especially attractive field in this respect, and notwithstanding the complications of its structure, we are in a position to-day to read more clearly the clinical picture that affections of this portion of the nervous system may produce.

The mid-brain is one of the smallest divisions of the central nervous system, yet within it are situated most of the neural mechanisms essential to proper functions. It contains nearly all of the incoming sensory tracts, important stations in the cerebellar paths, the entire group of motor conducting fibres, certain nuclear structures of the sympathetic nervous system, and some nuclei of the cranial nerves. By reason of the compactness of its anatomical arrangements, its lesions are apt to be accompanied by many clinical signs, which offer a series of classical groupings. These groupings offer much suggestive material bearing on topographical diagnosis, and for this purpose lesions in the mid-brain are practically illuminating.

The longitudinal section of the brain stem shows the limitation of this area, bounded caudad by the forward edge of the pons and cephalad by

the upper border of the anterior corpora quadrigemina. The aqueduct of Sylvius penetrates its entire length in its dorsal aspect. On cross section a division into three fairly well demarcated areas is apparent: the cerebral peduncles below, divided by the substantia nigra into the base and the tegmentum, and the anterior and posterior corpora quadrigemina above. It contains two large paired structures, the red nuclei. Its chief nuclear structures then are the anterior and posterior corpora quadrigemina, the red nuclei, the nuclei of the third and fourth nerves, the central grey nuclei, the small nuclei of the fifth nerve, the nuclei of the



Fig. 1. Section of mid-brain at lower level about crossing of superior cerebellar peduncles. (Jelliffe.)

posterior commissure and of the posterior longitudinal bundles, and the substantia nigra. At its upper border it is in close relation to the thalamus, and the median and lateral geniculate bodies, while smaller nuclear masses as yet little known are the dorsal and deep tegmental nuclei and the interpeduncular ganglia of Gudden.

The chief anatomical features may be seen in the accompanying cross sections, which represent the sections taken respectively at the pontine end, the middle, and the upper end of the mid-brain.

Four characteristic syndromes are described for lesions in this region. These represent only the more striking of the many pictures due to lesion in this area. They are the Weber (Gruebler-Weber) syndrome, the syndrome of Benedict, as Charcot names it, the Nothnagel syndrome, as Marburg suggests, and the syndrome of Combe.

The Weber (Gruebler-Weber) syndrome consists of a hemiplegia of one side with oculomotor palsy of the other side. It is one of the commonest of the symptom-groupings of mid-brain disease, and is due either to a lesion of the base, compressing one peduncle at about the point of egress of the oculomotor nerves, or to a lesion within the substance of the cerebral peduncles. The site of the lesion may be seen in the accompanying sketches, which show the areas involved—for instance in a thrombosis of the posterior cerebral artery—*arteria profunda cerebri*. (Gruenewald: *Zur Kenntniss der Thrombose der Arteria profunda Cerebri*, *Deutsche Zeitschr. fuer Nervenheilk*, 41, p. 485, 1911; and in a case reported by Cestan, *Revue Neurologique*, 1901.)

The present communication takes up the second of the mid-brain syndromes—namely, that of Benedict. This consists of a Weber syndrome plus a tremor on the side of the hemiplegia; that is some oculomotor palsy, with crossed hemiplegia, and movements usually of the nature of a cross between a paralysis agitans and a multiple sclerosis: a persistent tremor, which increases on motion to a slight extent.

Benedict described this condition in the first edition (1872) of his “*Nervenpathologie*.” He spoke of it as a symptomatic chorea. In his second edition (1874, p. 253) he said “In the first edition of my book, I have expressly stated that following an acute cerebritis in children, a hemichorea can persist, and as a matter of fact this occurs with the definite symptom complex of an acute cerebritis after an exanthematous disease. I have already separated these cases as symptomatic choreas. They constitute chronic affections, and are usually associated with hemiparesis.”

I have never seen his original case quoted, so give it here briefly (from his second edition, 1874, p. 311, obs. 214), as his first edition is not available. It is put under the caption “*Paralysis Agitans*” in the second edition: “V. Feld, four years old, admitted May 29th, 1872. Six months ago was sick with marked headache for four weeks. He had right ptosis at this time, and now has a right oculo-motor palsy and left abducens palsy. The head is sunk against the left shoulder, but could be held upright. The chin points to the right. There are tremors of the left hand. The patient can walk, but not far. The leg is over-extended at the knee, and is in constant motion. Upon executing certain movements, tremor is developed. There is no atrophy, no convulsions, no unconsciousness, no neuroretinitis.

“Next month the patient had a convulsive attack, with loss of consciousness. There was marked dyspnea. Two days later, another similar attack, which lasted half an hour. Following this convulsive seizure,

the patient staggered like a drunken man. Nine days later the patient had another seizure, and was unconscious half a day. He died a month later.

"Autopsy showed tubercles in the frontal lobe, in marginal gyri and in central convolutions; one in the cingulum. A tubercle the size of a pigeon's egg in the right peduncle, extending forward to the posterior perforated lamina. It involved the optic tract, and destroyed the right oculo-motor fibres. The left cerebellar peduncle was pushed to the left. There was involvement of the third ventricle and the right colliculus was pressed upon and partly destroyed."

In 1888 (*Mitth. d. Wien. med. Doct. Coll.*, p. 230) Benedict presented an adult with the syndrome, remarking upon the individuality of the disorder—which he says consists of an oculo-motor palsy of one side, combined with a hemiplegia of the opposite side and a tremor in the paralyzed extremity. In the patient presented the oculo-motor palsy took place three years previously, the left sided hemiplegia and tremor gradually. The tremor has some of the features of a multiple sclerosis tremor in that it is increased on intentional movement.

It may be seen from this short summary that the character of the tremor was somewhat puzzling to Benedict, in that he allied it successively with chorea, with paralysis agitans, and with multiple sclerosis. This uncertainty has not been confined to Benedict, however, for tremors due to mid-brain lesions are of a very diverse nature, as has been well shown by Holmes* and Marburg,** and as I have attempted to bring out in a paper recently read before the American Neurological Association,*** where the whole subject is discussed somewhat at length.

Before going on further, I desire to present the history of a patient, showing the history of the Benedict syndrome, which has however partly cleared up, leaving the tremor and some hemianopsia. Case I.—A. K., aged thirty-two, born in Austria. Her family history shows tuberculosis of the father, who died when she was very young. There were nine children in the family, five alive and well, four died in infancy. Hereditary factors unknown.

Patient was normally born, no eruptions, and learned to walk and talk at the proper time. Read at the age of six. At the age of seven had scarlet fever, was sick three months, and had a meningitic attack of uncertain character which left her very feeble, and an invalid for a year, but she had no paralysis, and no history of any tremor. She had no childish neuropathic signs, did not wet her bed at night, nor have bad dreams. She attended school until the age of fourteen, began to menstruate at seventeen, had had no adult diseases, no history of syphilis, no eruptions or scars. She has never had any convulsions, nor fainting attacks, and beyond an attack of cellulitis and headaches has always con-

*Holmes (*Brain*, 1904).

***Wien. klin. Wochenschr.*, 1905.

***Jelliffe: On Some Obscure Tremors Due to Mid-Brain Lesions.

sidered herself healthy. The death of her first husband, and the desertion of her second were her only emotional shocks. Nothing suggestive of a hysterical temperament save an incomplete account of two attacks of color blindness.

About two years ago she had a uterine operation, following severe headaches, but made a good recovery, and was fairly well until May 15th, 1910. Her husband was still living with her, and there was no intimation, she says, of any impending domestic difficulties.

Two weeks previously to May 15th, 1910, she had had severe headaches. One morning while collecting rents for the janitor, she suddenly collapsed and was semiconscious for a few moments. She then found that she could hardly walk because of the weakness of the right leg, and that it grew numb, and she lost all feeling in it. She went to bed, and while there the whole right side felt heavy and numb. She was dull and indifferent for several days, and could not feel the right side of her body as formerly. She noted that her right nostril seemed to be plugged up, and that she could not see as clearly as before. She had some difficulty with the right eyelid. The right side of the face and lips, and inside of the mouth appeared less sensitive. No pain. She said her speech was at first slightly indistinct; she stuttered, and could not move the right side of her face. She had no tendency to cry nor to weep. She saw double she thought but was not positive. The headache cleared up rather suddenly.

She was in bed two weeks, and then began to improve, at first being stiff in walking. The sensibility returned in her right side, her speech improved, and became normal she thinks within three months. The sight cleared up after two weeks. (She still has a hemianopsia unknown to her.)

For the past three weeks she has been having some prickling pains in the right arm, and also in the face, but they are not severe. The right hand has perspired more than the left. For two months past says she cannot work as a waitress, as she cannot hold the tray with her right hand, it commenced to tremble, and now she drops things from it. She says she cannot remember things as well as formerly.

Patient was seen October 15th, 1910.

Status Nervorum.—No cranial abnormalities. No painful percussion noted over head.

Smell is normal on each side.

Sight is apparently normal according to patient.

Examination for hemianopsia reveals marked homonymous hemianopsia, and retraction of fields. Wernicke's hemianopic pupillary phenomenon doubtfully present.

There are no scotomata and the fundi are apparently normal. Eye movements normal in all directions. There is slightly nystagmoid twitching on looking to the side. No diplopia.

Pupils are medium to small—3 to 4 mm.—round, equal in size; all

reflexes, light, direct and consensual, convergence, accommodation and sympathetic active and ample.

The trigeminal functions, motor and sensory are intact.

The facial innervation is symmetrical, and no trace of former possible ptosis. Hearing is slightly impaired on the right side. Rinné and Weber are normal. Vestibular function—galvanic and caloric—normal.

Facial reflexes normal, soft palate slightly to right side, tongue protrudes slightly to right. Speech is normal with slight hesitancy at times. Test phrases well pronounced. No sensory aphasia disturbance, no agraphia and no apraxia.

Upper extremities show no atrophies, hypertrophies, spasms nor hypotonus. Muscular power good, equal on two sides. Nerve trunks are not tender. Reflexes present and equal on both sides.

There is a very distinct tremor of the right hand, which is best described as a hybrid of a paralysis agitans and an intention tremor. Left hand intact.

She has no astereognosis, slight clumsiness of right hand, left very deft. Sensibility to all forms of stimulation apparently intact. Slightly increased moisture of right hand and arm pits.

Trunk.—Power normal. No painful points along spine; no unilateral pressure points over mammary or ovarian regions. Sensibility intact; motor power intact; no marked dermatographia; abdominal reflexes O. K.

Lower Extremities.—No atrophies, hypertrophies, spasms, nor hypotonus. Muscular power good and equal. Knee jerks equal; Achilles right slightly greater than left. No clonus, no Babinski nor Oppenheim, no painful nerve trunks, no Lasègue. Gait normal forward and backward, with open and closed eyes; no dizziness with different head positions, sensibility intact. No asynergia, and no vasomotor or trophic disturbances.

Status Corporis.—Normal, with question as to slight heart murmur.

Summary.—An apparently healthy woman of thirty-two, with possible mild heart lesion following severe scarlet fever at age of seven, suddenly develops with semiunconsciousness a mild right-sided hemiplegia, with hemianesthesia, hemianopsia and speech disturbance, and crossed oculomotor signs. She makes a rapid recovery, and after three months commences to develop a tremor of the right arm. After five months, then in apparent good health, she has a residual homonymous hemianopsia of the right side, a right-sided tremor resembling that of paralysis agitans, with slight intention quality, and only traces of her former hemiplegia—tongue to right—increased Achilles in right side.

Before discussing the implications of this case, a brief glance may be taken at the post-hemiplegic motor disturbances with which the case is allied, and which have been very extensively treated of in the literature, but which notwithstanding are not definitely located.

It will be recalled that Kahler and Pick believed that these post-



tr. ped. trans.

Fig. 3. Upper end of mid-brain; anterior end of red nucleus, showing rubro-thalamic and rubro-cortical paths. (Jelliffe.)

hemiplegic motor disturbances were due to some involvement of the pyramidal system. Charcot later constructed a special path in the internal capsule which, being involved, he thought caused a hemi chorea.

Bonhöffer attacked the problem in 1901, and placed the lesion for these motor disturbances in the superior cerebellar peduncle system.^{*} It has already been pointed out that the chief station of this system is in the mid-brain, and that it centers about the red nucleus. This structure receives the involuntary tonic innervating fibres from the cerebellum from the spinal side; sends fibres to the thalamus—rubro thalamic fibres, and also sends and receives fibres from the cortex by way of the lenticular nucleus and through other paths not yet completely worked out. (See v. Monakow: *Der Rote Kern*, 1910.) Caudally the rubro-spinal tract descends

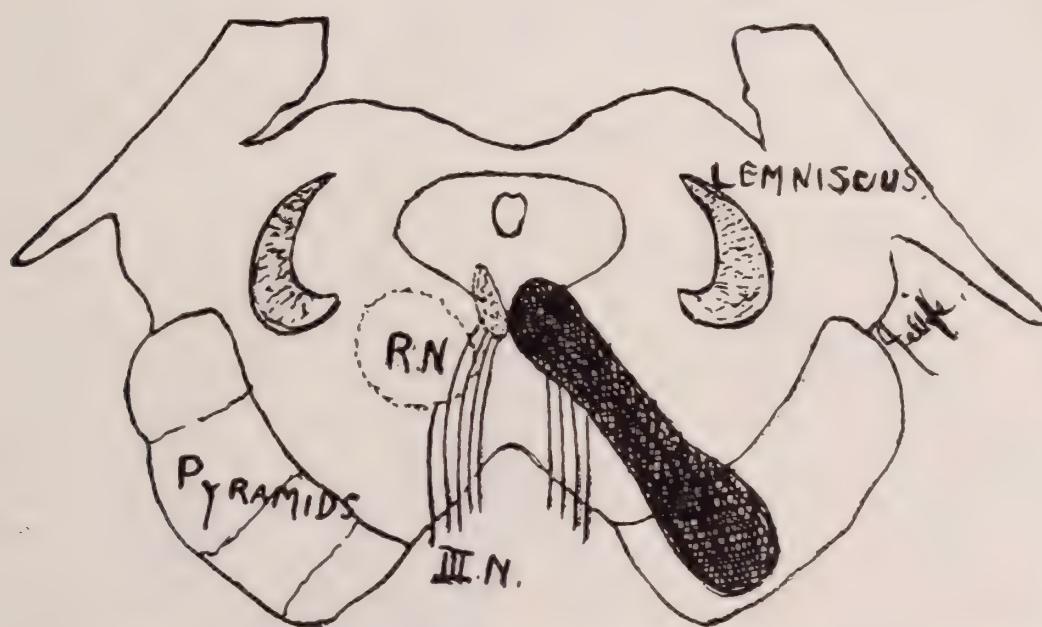


Fig. 4. Gruenewald's case of Weber syndrome. Location of degeneration in black.

to join the pyramidal tract and constitutes the chief tonic reflex path, conveying both cerebello-rubro spinal impulses, and cortico-rubro-bulbo-spinal impulses.

In view of the complexity of these connections the difficulty of accurate localization of these post hemiplegic movements becomes apparent.

A glance at the reported cases shows a variety of movements.* Thus there is simple tremor in the cases of Pilz, Fleischmann, Bristowe, Hoppe, Bonaforte, and Raviard. In the reported cases of Ferrier, Bristowe, Mendel, Gowers, Marina, Biancone, Bruns, Raymond, and Cestan the movement is similar to that of a multiple sclerosis. Again it resembles paralysis agitans in the reported cases of Sorga, Touche, Benedict and Eisenlohr. It had a choreiform and convulsive character in the cases of Vigoroux, Greiwe, Henoch, Benedict, Mohr, Henoch-Grawitz, Laignel Lavastine. It is choreiform in the cases reported by Archambault, Bouveret, Halban-Infeld, Kolisch, N. Bonhöffer, Chapotot, and Ceni, while in a

*Complete bibliography in paper of Jelliffe, l. c.

number it is described as athetoid, particularly in those of Leube, Wallenberg, d'Astros-Hawthorne, Van Oordt, Sorgo, Jelliffe, and others.

It thus becomes evident that a closer scrutiny must be given both to the character of the tremor observed, which fact has been most emphasized by Holmes, and to the exact involvement of the tracts in question.

This appears evident when we note the following divergent opinions. For the sake of clarification we shall consider only three localizations of lesions in this complicated reflex arc (1) Spinal to the red nucleus; *i. e.*, superior cerebellar tract rubro-spinal-bulbo system; (2) rubro-thalamic and thalamo-rubral; and (3) rubro-cortical, and cortico-rubral:

Thus, one scheme is as follows—:

- (1) Spinal=athetoid (Wallenberg).
- (2) Rubro-thalamic=Tremor (Touche).
- (3) Rubro-Cortical=Chorea (Putnam).



Fig. 5. Cestan's case of Weber syndrome. Location of degeneration in black.

Another arranges them as follows:—

- (1) Tegmento-cerebellar=Athetosis.
- (2) Rubro-Thalamic=Chorea.
- (3) Rubro-Cortical=Tremor.

Holmes in collecting the autopsy findings of 60 cases, believes that the evidence points to athetoid movements when the thalamus is involved; to choreic movements when the mid-brain and ganglia are involved, and to tremor when the lesion is in the mid-brain itself. He does not go into the analysis of the tracts as here outlined.

From my own studies I am disposed to class the athetoid movements as due to an interference with the rubro-thalamic and thalamo-rubral fibres. They usually form a part of the thalamic syndrome of Dejerine and Roussy. (See Jelliffe: Thalamic Syndrome, *Medical Record*, 1909.)

Choreiform and choreo-ataxic movements I am inclined to place in the

mid-brain with involvement of the superior cerebellar peduncles; that is when the lesion tends to extend spinally and cerebellarly. Whereas the purely paralysis agitans and multiple sclerosis-like tremors I am inclined to regard as due particularly to the lesions of the rubro-cortical or cortico-rubral fibres, as they sweep through Forel's field, or when the lesion is partly in the nucleus-ruber itself.

Up to the present time, the lesions reported have usually been too extensive to permit close deductions as to the fibre tracts involved—save perhaps in the case of the athetoid movements. Here it would seem that the rubro-thalamic fibres are invariably affected (Hertz). For this reason I am inclined to refrain from taking too positive a position, thus agreeing with both Marburg and Halban-Infeld, that we are not yet in a position to dogmatize.

This brings us back to the consideration of the Benedict syndromes, where, for the most part, the movements are of the paralysis agitans or choreiform type, and where the oculo-motor and pyramidal systems are involved.

The case here reported, however, shows a rather anomalous condition, in that both the oculo-motor and pyramidal symptoms have cleared up, leaving only the tremor and the hemianopsia, agreeing closely with a case reported by Blessing (*St. Petersburg med. Wochenschr.*, 1896).

The latter requires some explanation. It has been found not infrequently with Weber's syndrome. It was present in two of Holmes' cases; Joffroy (*Nouvelle Iconographie de la Salpêtrière*, 1898; also *Revue Neurologique*, p. 430, 1900) says it is not infrequent, and refers it possibly to the branches of the posterior communicating which sends branches to the occipital lobe. Brissaud has called attention to the fact that the collateral branches of the posterior cerebral go to the posterior optic tract, and that hemianopsia can result from their involvement. Lesion of the anterior tectal region of the mid-brain can also cause a hemianopsia, and I am inclined to dispose of my case as a lesion of the optic tracts in their ascent to the corpora quadrigemina, and of the rubro-cortical tracts as they sweep out to Forel's field. I shall not exclude, however, a double lesion, implicating the posterior communicating with a lesion of the mid-brain and of the occipital lobes. Furthermore, a basal lesion is not excluded.

KNEE-JOINT TUBERCULOSIS IN ADULTS.*

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The purpose of this paper is to present the writer's experience with tuberculosis of the knee-joint in patients beyond the age of childhood and adolescence. It will probably be conceded by this audience that in cases below an age which may be placed arbitrarily at eighteen years, conservative treatment will usually give more satisfactory results than radical operation. In cases beyond this age a well-marked difference of opinion has existed for years in regard to the treatment. With the view of attempting to clear up the matter in my own mind, I have for some time past conducted an investigation into the late results of the ordinary methods of treatment. The available statistics have been examined. The case-reports of my own patients have been read over, selecting only those who have been under treatment at least two years. The opinions and experiences of many of my surgical and orthopedic friends have been inquired into with some degree of care. The attempt has been made to find satisfactory answers to the questions which are of practical importance to the patient, such questions as are usually asked before he makes his decision as to the method of treatment to be adopted.

What shall we tell him as to ultimate outcome of his disease? Will his knee be permanently stiff, or will it be normally movable?

Will there be an actual or potential danger to his life? How long will it take to cure the disease? These questions seem to me to be of the utmost importance to the patient and to the physician.

The results of my investigation along these lines, briefly stated, are as follows:—

A very few patients, with a mildly virulent type of tuberculosis, chiefly synovial, and with very little destruction of the cartilaginous surfaces of the bones, have been cured of the disease and have obtained a useful or nearly normal range of motion. This has required from five to ten years of constant treatment. Personally, I have never seen or treated an adult in whom this result has been accomplished, although I have had charge of a fairly large number of cases.

Practically all the other cases under discussion have either had impairment of motion to a marked and disabling degree or else a complete ankylosis. Those in whom conservative treatment was used have had no

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better results, speaking broadly, than those treated by radical operation, and the duration of treatment has been, as a whole, enormously greater.

At least 25 per cent. of all cases of knee-joint tuberculosis die of tuberculosis or its sequelæ.

We may state to our patient, therefore, that if he has the synovial type of disease with little or no bone involvement, he has a possible chance of being cured by careful, conservative treatment lasting at least five years; if much bone and cartilage involvement exists, he has three chances in four of recovering from this tuberculous infection; that his knee is practically certain to be stiff, and that it will take from five to ten years to cure the disease itself.

It would seem, therefore, if these conclusions be accepted, that the general results of conservative treatment do not justify ordinarily the great economic losses in time and earning capacity among those classes of people where time and earning capacity are of much importance. To the person of limited means and small resources, a course of treatment covering several years is a serious matter. It is among such people that the best treatment is that which restores to them most quickly their earning capacity, diminished more or less by a stiff knee. For cases of this type it would seem that early operation is the course to recommend.

For the patient who has the time and money to spend, it is no doubt proper to allow him to choose the conservative methods, providing that his case is suitable for such treatment. A careful examination must be made to determine the type of disease. The history, the physical examination and the *x*-ray plates will establish fairly conclusively whether the disease is mainly bony, or synovial, or both.

The relative frequency of primary synovial tuberculosis as compared with primary bony tuberculosis is still a matter of some doubt. Koenig, a man of enormous experience, believed that the one was as common as the other. A few years ago, Nichols, of Boston, demonstrated very conclusively that primary synovial tuberculosis is exceedingly rare. It is impossible to disregard the findings of this able and painstaking investigator, who showed a bone focus in practically every one of the large series of tuberculous knee-joints which he examined, and yet nearly all of us see many cases where clinically the disease seems to exist solely in the synovial tissues of the joint. It cannot be denied, also, that an original synovial infection is theoretically possible, however infrequently it may actually occur.

At all events, when synovial disease is the predominating factor in the individual case, and when the *x*-ray reveals unaltered joint-cartilages, it may fairly be left to the patient to decide upon his treatment. He may be willing to undergo the hardship and expense of conservative treatment exclusively, or for a time long enough at least for his individual resistance and the relative virulence of his infection to be determined. The opsonic

index is not nearly so valuable in this connection as is the careful observation of the subjective and objective symptoms. If, after a few months of immobilization and rest, there is a perceptible decrease in the severity of the symptoms, it may be justifiable to persist in the conservative treatment.

It seems reasonable to believe that injections of certain drugs may have a modifying or a curative action on tuberculous tissue. Although I myself have never seen any convincing results from the injection of iodoform emulsion, many competent and reliable men have reported distinct benefit from its use. The tincture of iodine and Lugol's solution of iodine injected into the joints, have given some excellent results in children at my clinic, and in a number of psoas abscesses in adults, but in the knee-joints of adults they have disappointed me. Murphy's formalin injections have not appeared to do any better than the iodine, and theoretically the formalin would seem likely to harden the tissue to an undesirable degree. Bier's constriction, while excellent in elbow and wrist tuberculosis, has not seemed to benefit any of my cases.

Tuberculin, in very minute doses, is apparently of some slight advantage, although I do not want to advocate its general use at the present time. Spengler's I. K. is under trial, and may be useful when its peculiarities are better defined in joint-disease.

These, or other conservative measures, with, of course, immobilization by cast or splint, and with general hygienic treatment, may be tried in the milder cases without much danger. If they prove unsatisfactory, or if the disease assumes greater virulence, it is my belief that an operation should no longer be delayed, and that a more or less typical excision of the joint should be performed. The exact type of operation does not appear to be of much importance. Ely believes that if the joint be made stiff the tuberculosis will cure itself. He therefore makes no attempt to remove all of the tuberculous tissue, but rapidly saws off a thin slice from femur and tibia and immobilizes the leg. This is a most attractive idea, as it simplifies and shortens the operation materially, but I myself have never been able to resist the temptation to remove as much as possible of the pathological tissue.

It seems wise to make a fairly typical excision of the joint in the average case. I have several times used two Lane plates to secure immobilization after excision of the knee, with very satisfactory results, and I expect to make this a part of my regular technique. Wires and nails have been unsatisfactory in my hands. Many operators make no attempt to fasten the bones together, but rely on the splint or cast to maintain apposition. This is a dangerous practice unless a long spica-cast be applied from waist to toes and even then it is none too safe. With the Lane plates, however, the long spica is not always necessary. A simple circular cast can be used from toes to groin, fitting very closely to the thigh and with little or no padding above the knee.

Drainage should always be employed after an excision, for thirty-six hours or longer if necessary. Neglect of this precaution may lead to serious results. A small piece of gutta-percha tissue, folded into a small cigarette, is better than most other drains. A window is cut on both sides of the cast for the removal of the drains and for the subsequent dressings.

It is of the greatest importance that the immobilization be continued for a very long time, at least six months, and, better, a year; but the cast may be replaced in suitable cases by a sole-leather splint made over a cast of the leg and reinforced with steel strips. It takes much longer to get a bony union after an excision than many authors would have us believe, and if the apparatus be removed in two or three months, more or less flexion is apt to occur, which may need a further operation for its correction.

It will be seen from the foregoing remarks that I am advocating the artificial stiffening of the knee-joint in practically every case of knee-joint tuberculosis occurring in adult life. This must be understood to apply solely to cases where the joint itself is affected, and not cases where a focus exists in the tibia or the femur, which has not yet invaded the joint. In the latter class of cases an extra-articular operation can almost always be performed with success, and the integrity of the joint can be preserved.

The condition of the patient with a stiff knee is not as undesirable as is sometimes supposed. He suffers very little inconvenience except when dressing himself, and he is able to perform many kinds of physical labor with little difficulty.

Moreover, in these present days and future promises of operations designed to transform ankylosed joints into movable ones, it is possible to hold out some hope of restoring a fair range of motion when the tuberculosis of the joint shall have permanently disappeared. It is true that the various arthroplasties are less successful in the knee than in many of the other joints, but Murphy's operation is sometimes successful even in the knee. The method of Baer, of Baltimore, who introduces a joint-lining of chromicized pig's-bladder, is logical, and deserves a wide trial.

It seems possible, therefore, to hold out to the patient some hopes that the ankylosis may not necessarily be permanent, although arthroplasty is hardly likely to become a routine in our generation.

The actual transplantation of joints, as attempted by Lexer, is as yet in its infancy.

We should, in my opinion, fearlessly point out to the patient, no matter in what walk of life he may be, the advantages of a safe, painless and useful leg as compared with one which is dangerous, painful, and disabling.

A FEW POINTS ON THE MORBIDITY AND MORTALITY OF THE NEWLY-BORN INFANT.

BY JOHN ZAHORSKY, M. D., of St. Louis.

The newly-born infant is singularly liable to a variety of pathogenic influences, which, combined with the feeble resistance offered by many infants, produces a period of life whose morbidity and mortality is much greater than any subsequent period. Thus Prausnitz from German statistics found that out of 10,000 births, 330 infants were still-born and 284 died during the first week of life. In other words, about 3 per cent. of all infants die during the first week. During the second week the mortality reaches 4 per cent.

Statistics teach that while the general death-rate of children has declined very much in the last thirty years, the mortality in infants under one year of age remains stationary. I can find no figures to show the reduction in the mortality of the newly-born, and yet, as regards the premature infant, the number saved has certainly increased judging from Budin's figures.

What is the cause of this high mortality and can anything be done to lessen it?

Of the causes that contribute in the largest measure to the mortality of the newly-born, premature birth undoubtedly has first place. The figures, as to the number of infants born before term, vary much from different sources. Some of these variations may be due to a difference in opinion as to what constitutes premature birth. Thus Miller at Moscow reports 5 per cent., while Fehling in Halle gave as high as 25 per cent. Budin's figures are 10 per cent. In the Bethesda Maternity Home, for the last nine years, 46 cases were treated as premature out of 653 births, or about 7 per cent. If we add thirty-five infants who were born two or three weeks before term, the total number of cases is 81, which increases the rate to 12 per cent., even more than the figures of Budin. During this same period nineteen infants were still-born, that is about 3 per cent., which agrees with the Prausnitz figures.

Statistics from the same institution showed that only eight deaths occurred during the first two weeks of life out of about six hundred infants born at term or near full term. Eleven infants out of forty-six prematurely born died during the first two weeks, which again shows the marked influences of prematurity on the death-rate of the newly-born. If these are added to the eight deaths of infants born at term, it is found that the mortality is 3 per cent., which again approaches the Prausnitz figures.

Another cause of infant morbidity and mortality are the various malformations which afflict the newly-born infant. Among these are cleft palate which often leads to serious nutritive disorders. Imperfect anus and atresia of the gastro-enteric canal in some of its parts demand prompt surgical intervention, and the mortality at best is high. Pyloric stenosis is by no means a rare defect in the newly-born. Deformities of the heart may give rise to serious symptoms soon after birth. The importance of atelectasis pulmonum has in my opinion been overestimated in the morbidity of the newly-born.

The more severe malformations such as acrania, hydrocephalus, etc., are fortunately rare.

Of great importance in the etiology of disease are the birth traumata. Most of these have no ill results if treated properly on surgical principles. Injury to the brain resulting in cerebral hemorrhage may lead to immediate death, but more often to subsequent derangement of cerebral growth and functions. Asphyxia of the new-born infant must also be classed among the traumata.

Another group of causes in the morbidity and mortality of the newly-born are the infections. These do not differ from those in older infants and children except in some of the clinical manifestations engendered by the physical peculiarities of the newly-born. It is a mistake to assume that the young infant is comparatively immune to any infectious disease.

Hereditary syphilis occupies a large place in this category. The infectious diseases may be acquired *in utero* and the clinical features be manifested in the newly-born. I have seen one undoubted case of estivo-autumnal fever transmitted from the mother to the fetus.

Finally acute digestive disturbances occur which may give anxious moments or even prove fatal.

It is clear from this very brief summary of the causative agents which produce disease in the newly-born, that effective prophylaxis is a complicated subject, and it is doubtful that any marked reduction in the death-rate will occur soon. No doubt much depends upon the obstetrician, but a still more important factor is the physical and social condition of the parents, a factor almost beyond our control. The infections of the newly-born should be reduced to a minimum by proper preventive measures, but among the poor and ignorant, tetanus, erysipelas, sepsis, bronchopneumonia, and other infections will always carry off a large number of newly-born infants.

The pediatrician is especially interested in the treatment of disease in the newly-born, and it can be safely asserted that the last decade has materially advanced our knowledge in this direction. In the first place, the case of the premature infant has been placed on more rational principles. The work of Budin, an obstetrician, in this field deserves special mention. His three great laws for the care of the premature infant should be known by every practising physician.

These are in substance:—

1. The premature infant should be kept warm.
2. It should receive abundant nourishment.
3. It should be guarded against infections.

It is well to emphasize here that the most common mistake made by nurses in their effort to keep the infant warm is to overdo the matter. The premature infant is just as susceptible to heat as to cold. How common it is to find a premature infant with a marked elevation of temperature entirely due to the application of too much heat. The feeble infant should not be kept too warm. A difference of at least 6° F. should be allowed between the body temperature and the surrounding air. This leaves a margin for the dissipation of heat from the little body and stimulates internal oxidation. The temperature for the incubator according to Budin should not be over 86° F., and this is safest except for infants weighing not more than 1,200 grm.

It is a common misconception that the incubator is a great life saver. While the regulation of warmth has a high importance, the principal difficulty in keeping the premature infant alive is the supply of food. It needs proportionately at least four times as much food as an adult. The adjustment of the alimentation to the caloric needs of the body is one of the most valuable methods of feeding such cases. It will not do to prescribe a minimum quantity to be given every hour. The physician must know that the infant requires a certain quantity of food having the needed calories, and great pains must be taken to feed the baby this amount.

The premature baby cannot wait three days for its mother's milk. It must have a little food soon after birth. Breast-milk from another woman is best. When this cannot be obtained, whey or peptonized milk may be used. At first the milk is given in small quantities, but it must be increased daily until at the tenth day an alimentation having an energy quotient of 120 calories is administered.

The premature infant most commonly dies of apnea, a sign of exhaustion, which is characterized clinically by cyanosis. These attacks of cyanosis are clear indications that something is wrong in our regime, and inquiry must be instituted at once in the heating apparatus and especially in the food supply. While insufficiency of the food leads to cyanosis, too much food often leads to dyspepsia and this again to fatal cyanosis.

The rearing of the premature infant, weighing less than 2,000 grm., requires the attention of trained nurses and the constant supervision of the physician; it is obvious that this is expensive. This again emphasizes that the reduction of infantile mortality is a sociological problem, and it is needless to state that the solution of these problems is very slow.

It is wise to emphasize that the newly-born are subject to a variety of infections, not usually mentioned in textbooks. A few instances from practice may prove interesting in this connection.

A female infant, five days old, was suddenly seized with high fever and prostration. The disease was puzzling until the urine was examined, when the presence of a severe pyelocystitis was discovered.

Another infant, three days old, began to have bloody and mucous passages which proved to be the beginning of an acute colitis.

A third instance was that of an infant, a few days old, with puzzling septic symptoms due to a suppurative otitis media.

Several cases of acute suffocative bronchiolitis in the newly-born have come under my observation. In two instances the mother had influenza when the infant was born.

A case of estivo-autumnal malarial fever in an infant twelve days old has already been referred to.

Erysipelas neonatorum is a well-recognized clinical condition. Several cases have come under my observation, and, as far as I know, all died. This still remains the most formidable of the diseases in the newly-born.

Anti-tetanic serum has very much reduced the mortality of tetanus. Recently two cases have come under my observation, both of which recovered. The serum should be injected in full doses promptly on the appearance of the first symptoms. On account of the rigidity of the muscles of suction and deglutition, feeding by gavage should be resorted to early, as the rigidity remains for several weeks and the infant may die of exhaustion and inanition.

Hemorrhagic disease of the newly-born seems almost to have lost its terrors from recent reports. It has been found that the hypodermic injection of serum, preferably from a healthy human being, is curative in most cases.

The newly-born infant readily becomes immune to the influenza bacillus and the diplococcus lanceolatus, the most common cause of infection of the respiratory tract. Efforts at keeping up the nutrition and maintaining cardiac efficiency often succeed in carrying the patient through the dangerous period.

The nutritive disturbances of the newly-born may almost entirely be obviated by feeding only the natural secretion from the mother's breast. To oversee the establishment of the proper mammary function is one of the duties of the obstetrician, who will admit that difficulties are common clinical experiences. One of the most important features of the problem is to maintain healthy nipples. In recent years a great mistake, I believe, has been made in prescribing antiseptic measures to prevent excoriations and fissures of the nipple. Lotions of alcohol, witch hazel, and boric acid solutions should not be used. When one remembers how readily the hands become tender and chapped from too frequent washings and the application of antiseptics, it is obvious that the tender mammilla can not endure this practice. The nipples and breast of the mother should be wiped dry immediately after nursed, and washing should be resorted to not more than once daily.

Dr. E. W. Saunders of St. Louis has recently introduced the lanoline prophylaxis. After each nursing benzoinated lanoline is applied to the nipples which is again wiped off before nursing. No washing is done. The success of this method has made him and his assistants enthusiastic over its merits. It certainly is superior to the lotions and powders usually advised.

It should be remembered that the intestinal mucous membrane of the newly-born infant is permeable to bacteria and probably undigested food elements. Infections and various anaphylactic reactions may readily occur. Hence, rigid asepsis in the dietary of the infant is absolutely necessary. When an artificial food is given, it must always be as free from bacteria as possible, that is thoroughly sterilized.

In conclusion I must repeat that the prophylaxis of the diseases of the newly-born is a broad and difficult field, and that the treatment of disease is generally satisfactory when the parents have the means to provide what is necessary.

ESTIVO-AUTUMNAL MALARIA WITH AN UNUSUAL ANEMIA.

By L. M. WARFIELD, A. B., M. D., of Milwaukee,
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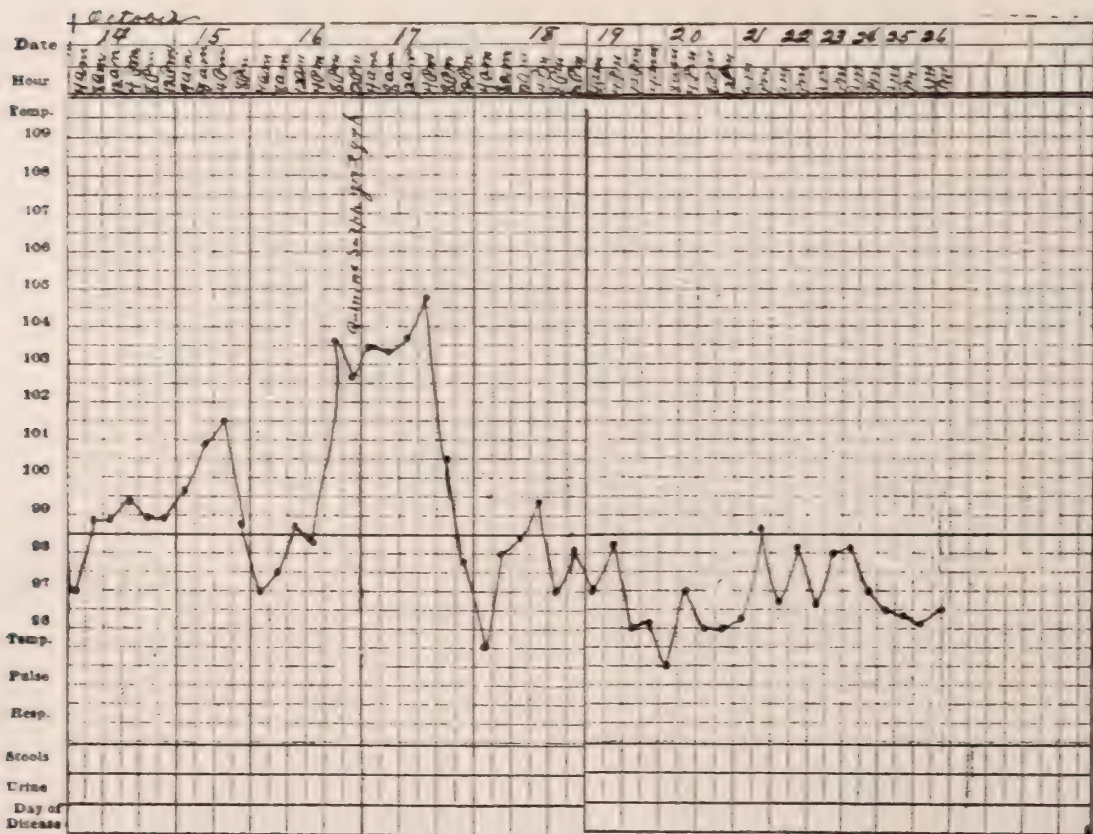
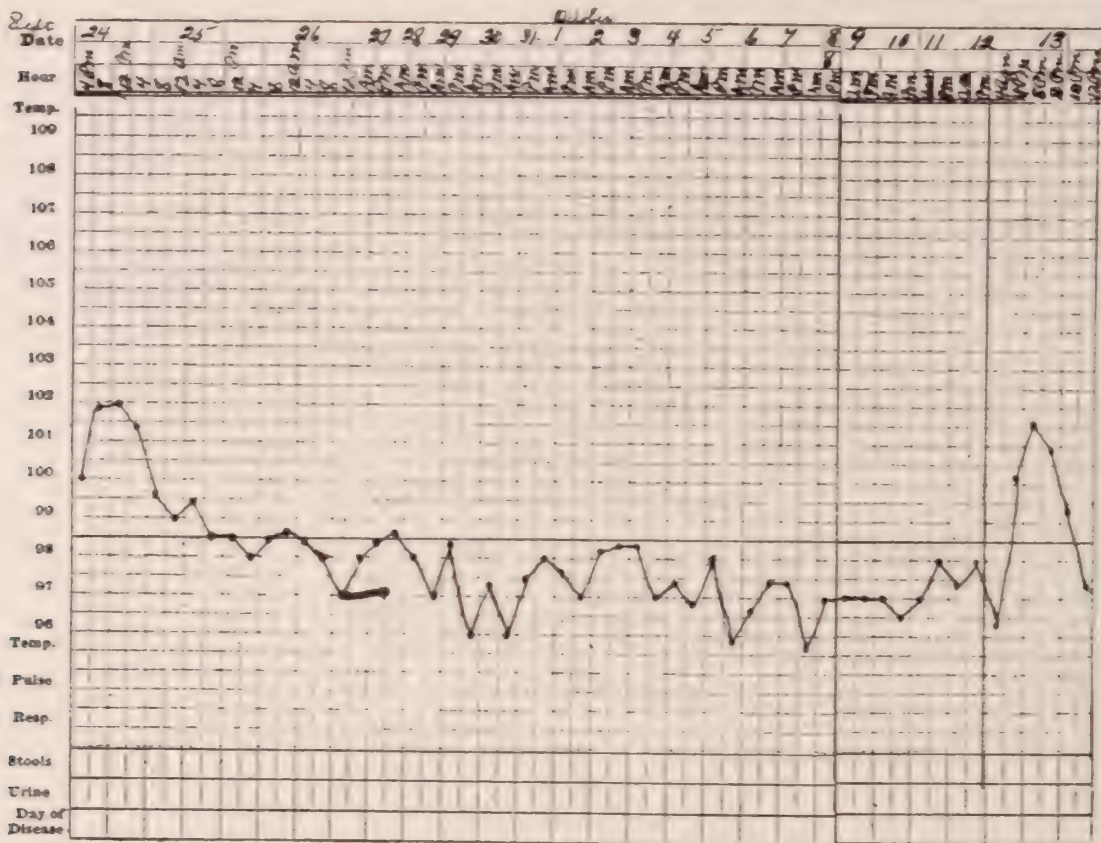
Anemia following one or more attacks of malaria is exceedingly common. The anemia is of the secondary type, that is the decrease in the number of red cells is coexistent with a decrease in the hemoglobin content. Nucleated red cells are not found nor do the red cells show anisocytosis or poikilocytosis. Of the many blood specimens of malaria which I have examined within the past ten years, there have been all grades of anemia and all types and grades of infection with the parasite. This case is the first in which I have found such a blood picture.

The history of the case with the blood examinations is as follows:—

C. H., a white man aged twenty-one and a native of Ohio, entered the Milwaukee County Hospital on September 21st, 1910, complaining of cough and malaria. He has always been well. In August of this year he was working around St. Louis as a railroad construction hand. He was taken ill with chills followed by sweats and fever. Other workmen had similar attacks. For about a week his paroxysms occurred every other day, then they came daily. He was in a hospital in St. Louis for two weeks. He then came to Beaver Dam where he remained three days and finally came to Milwaukee. He was ill at the time and was placed in the Emergency Hospital where a diagnosis of malaria was made from the history and he was given quinine. The blood was not examined prior to the administration of quinine. He was in the Emergency Hospital two days before his transfer to the County Hospital.

On admission the patient was seen to be a tall man, slow of speech and considerably under weight. There was a subicteric tinge to the conjunctivæ, and the scleræ were pearly white. The skin had a lemon-yellow tint, the mucous membranes were almost bloodless. The tongue was lightly coated, pale, and moist. No glands were palpable. The chest was broad and flat and the lungs and heart appeared normal. The abdomen was retracted, the spleen easily palpable about 5 cm. below the left costal border. It was firm, the edge rounded, it was not tender. The reflexes were present but sluggish. The urine contained a slight amount of albumin and a few hyaline casts. The temperature was 100° F. when he was admitted in the afternoon. (See chart.) In two hours it rose to 101.8° and by next morning was normal. Careful and prolonged search both in fresh and stained smears revealed no parasites or no pigment. The corpuscles were very pale and there were great differences in size.

The temperature remained normal, the patient quite comfortable except for weakness. In view of the facts that there was no fever, no parasites were found and the appearance of the patient was so suggestive of a grave anemia, a blood count was made. It showed reds 1,520,000, Hb. 38 per cent. (Sahli), whites 4,550, color index 1+. The blood was very pale, watery, and thin, but did not have the appearance sometimes seen in pernicious anemia of a separation of plasma and red cells. A differential count showed polymorphonuclears 54.4 per cent.; small mononuclears



30.8 per cent.; large mononuclears 5.2 per cent.; transitionals 0.8 per cent.; eosinophiles 3.6 per cent.; neutrophilic myelocytes 4.4 per cent.; eosinophilic myelocytes 0.8 per cent. In counting 250 cells one normoblast was seen. There were polychromatophilia and granular degeneration of the red cells, very slight poikilocytosis but much difference in size of the red cells. No parasites were seen. The von Pirquet test was negative. Examination of the stool showed no ova, no occult blood.

A tentative diagnosis of pernicious anemia was made and the patient given arsenic. From September 22nd to October 13th his temperature was normal. Blood-counts are shown in the table appended. No parasites were found. The blood was stained by Hasting's modification of the Nocht-Jenner stain.

On October 5th he was up and around, doing light work in the ward. His weight had increased, the color of the skin was still slightly lemon-yellow and the spleen was palpable.

On the 7th he had a mild epistaxis but otherwise seemed in good condition. A test-breakfast was given on the 9th at 8 a. m. At 8:45 the tube was passed but nothing was obtained and the lavage water returned clear.

For several days he had attacks of mild epistaxis and on the 13th, with no chill or chilly sensation, his temperature rose to 101.5° F., returning to normal in eight hours without sweating. On the 14th there was no paroxysm. The blood was examined and both in fresh and stained smears there were fairly numerous ring forms and hyaline forms of the estivo-autumnal malarial parasite of the tertian type. There were no crescents and no pigment. On the 15th there was a rise of temperature to 101.5° F. without any preceding chill or succeeding sweat. On the 16th numerous parasites were found, some cells containing two ring forms. On the 17th he had a perfectly typical febrile paroxysm as seen by the chart but still there was no chill or no sweat. Quinine in solution was given and except for a rise on the 18th to 99.2° F. the temperature has been normal and the patient is well. The spleen, which was palpable on the 18th, rapidly returned to a size which could not be felt. It will be seen that on the 16th there was one normoblast found in counting 250 white cells. The enormous number of platelets was a striking characteristic of this specimen. No myelocytes were seen. One cell which resembles the megalokaryocyte of the bone-marrow was found.

Parasites were found on the 18th, but on the 20th prolonged search revealed none. None had been seen on further examinations.

The malarial parasite which is classed among the sporozoa, genus *hemosporidia*, has been divided into three varieties: the *plasmodium vivax* or simple tertian parasite; the *plasmodium malariae* or quartan parasite; and the *plasmodium falciparum* or estivo-autumnal parasite. This last is now subdivided into two forms, the quotidian and the tertian. The quotidian form is small, very actively ameboid, is ring form, has

DIFFERENTIAL COUNT					REMARKS									
Date	R. B. C.	W. B. C.	Hb%	C. I.										
					Polymorpho- nuclears	Small mon- onuclears	Large mon- onuclears	Transition- als	Eosino- philes	Basophiles	Myelocytes	Neutrophils	Eosinophils	
9-24-10	1,520,000	4,500	38	1.26+	54.4	30.8	5.2	0.8	3.6	0	4.4	0.8	One normoblast; granular degeneration of red cells, very little poikilocytosis, much difference in size of red cells. No parasites.	
9-30-10	2,528,000	5,200	55	1.1	60	26	9.6	0.4	3.2	0.8	0	0	Less granular degeneration. No nucleated reds found. Cells more equal in size. No parasites.	
10-12-10	3,200,000	5,000	65	1.+	....	....	....	....	....	....	....	....	No differential count.
10-14-10	3,280,000	5,600	65	1.+	63	19	13	1	4	0	0	0	No nucleated red cells. Reds show some variation in size and shape. Signet ring estivo-autumnal parasites fairly numerous.	
10-16-10	.....	.....	.....	.....	51	23.7	12	4	9	....	....	....	One normoblast. Marked increase in platelets. Polychromatophilia. Many very large mononuclear cells with irregular and mulberry-shaped nucleus. One megakaryocyte (?), numerous signet ring forms. (See Fever Chart.)
10-17-10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Few parasites. Platelets far less numerous but seem increased. Granular degeneration of red cells rather marked.
10-18-10	.....	.....	.....	.....	56	14	23	6	1	0	0	0	Very few parasites. Many large mononuclear cells as above. Some almost denuded of protoplasm. Megakaryocyte(?).
10-20-10	.....	.....	.....	.....	52.4	23.2	16	1.6	5.6	1.2	0	0	No parasites. Slight granular degeneration, otherwise appear normal.
10-28-10	3,764,000	5,300	82	1.1+	65.2	12.4	14.8	0.4	6	1.2	0	0	No parasites. Occasional cell with slight granular degeneration, otherwise normal.	
11-5-10	4,724,000	5,800	93	1.+	51.2	14.4	20.0	2.0	11.6	0.8	0	0	Cells appear quite normal.	

little or no pigment and sporulates in twenty-four hours. The adult parasites form not more than ten spores, usually six or eight. The tertian form is larger, is only sluggishly ameboid, very early contains pigment, forms the so-called signet ring bodies and has a cycle of sporulation of forty-eight hours. The spores number from fifteen to twenty. These forms can be differentiated under the microscope. Further the type of fever differs. In the quotidian paroxysm the rise is abrupt to a maximum and the fall is also abrupt to normal, the whole paroxysm usually occupying not more than fourteen hours. The tertian paroxysm shows a sharp rise, then a slight fall, then a further and greater rise lasting over fourteen hours, and then an abrupt fall. The paroxysm may last from twenty to twenty-four hours, or even more. Should there be double infection with the tertian form the temperature is usually remittent instead of being intermittent. We are speaking only of the ordinary moderately severe infections. Very severe infections modify the temperature curve markedly.

The blood-changes are interesting. Usually there is a severe anemia of the secondary type. The leucocytes are reduced in number and the large mononuclear forms are relatively increased. These changes are admitted by all observers. In over 2,000 examinations Craig saw 6 cases with a pernicious anemia type of blood. These occurred as sequelæ to severe attacks and all proved fatal. The blood showed no nucleated red cells. The number of red cells reached the low figure of 490,000 per c.mm. There was a relative increase in the polymorphonuclear forms with no leucocytosis. There was no poikilocytosis but there were great differences in size among the red cells. Craig thinks that in certain cases the classical type of pernicious anemia may occur as a sequela to infection with the estivo-autumnal parasite. Cabot maintains that while this does occur it is excessively rare, and such cases having a known etiology cannot be classed as cases of primary pernicious anemia. He says that in none of the 1,200 cases of pernicious anemia analyzed by him did pernicious anemia develop during an attack of unquestioned malaria.

The blood-picture in this case was therefore most unusual. It is also rather remarkable that a count made on November 5th, at a time when the patient seemed, and apparently was, perfectly well should show a color index of 1+. It is possible that he was one of those individuals whose color index is normally 1 or 1+. The finding of myelocytes with nucleated red cells and an anemia with high color index plus general symptoms and signs was certainly sufficient basis for a provisional diagnosis of pernicious anemia. There are febrile cases of pernicious anemia in which the spleen is not infrequently enlarged. Had we had time to make daily careful examinations of the blood we should have found the parasites of malaria before the onset of the first paroxysm.

Another interesting feature of the case is the abruptness with which the quinine stopped the infection. As a rule one does not expect the

estivo-autumnal parasite to be so susceptible to quinine. It is the most resistant form. Here, however, quinine sulphate in solution in 10-grain doses every four hours was begun in the middle of the last paroxysm. There was no further paroxysm. It is generally agreed that in the simple tertian and in the quartan forms one large dose should be given just at the end of the paroxysm while the sporulated forms are still free in the plasma. This in most cases will prevent further febrile attacks. After that the drug should be given for several weeks at increasing intervals. In the estivo-autumnal form it seems best to administer the drug in 10-grain doses every four hours for several doses. The intervals may then be lengthened, but quinine must be taken off and on for several weeks.

It is difficult to explain the rather wide fluctuations in the white cells. The leucocytes remained practically the same and yet the small mononuclear forms varied from 30.8 per cent. to 12.4 per cent., the large mononuclear forms from 5.2 per cent. to 23 per cent., and the eosinophiles from 1 per cent. to 11.6 per cent. Examinations of the stools revealed no ova of intestinal parasites. So far as can be learned, the blood-picture of this case was unique. It demonstrates the value of blood examinations in clearing up a diagnosis and indicating the correct line of treatment to be pursued. We might have considered the case one of malarial fever from the beginning, basing our diagnosis on the history alone. Nevertheless we could not have been sure. The patient would not have had the same incentive to take quinine over a long period of time, and a relapse would have been almost certain to occur. Now he knows absolutely, and with our definite information we can drive home the necessity of prolonged treatment which he will be more apt to carry on because of the very fact that our statements carry the weight of certainty.

TREATMENT OF CANCER HIGH IN THE RECTUM.

By CARL B. DAVIS, M. D., of Chicago.,
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As early as in 1826 Lisfranc¹ extirpated the rectum for cancer. The difficulty in reaching high-lying growths, the unsatisfactory hemostasis and the high mortality acted as a check upon the growth of this branch of surgery while other surgical divisions made rapid progress. Modern surgery of cancer high in the rectum begins with the development of the sacral route by Kraske² in 1885. He observed the immunity with which the sacrum could be removed in part in a case where Volkmann inadvertently opened the sacral canal while chiseling away a sarcoma. Following the first report of Kraske the literature of this subject has steadily grown in volume until it forms too great a field to be carried in this paper. Ito and Kunika³ and Goullioud and Fayasse⁴ have presented a review of the literature up to 1905.

Volkmann⁵ in 1877 first suggested an abdominal incision in combination with the perineal or sacral route, to determine the extent of the disease. Koenig⁶ was the first to report an operation of this type. In this instance he removed the entire rectum and brought the end of the bowel through the abdominal wall to an inguinal anus. Some years later Jeannel,⁷ employing the combined abdomino-perineal operation, removed the rectum and brought the sigmoid down to the anus with sphincters intact.

Since that time the sacral and the abdomino-sacral routes have each had earnest supporters. Most prominent among the advocates of the purely para-sacral operation is Hochenegg. Zinner⁸ reports a series of 320 cases of carcinoma of the rectum operated by Hochenegg and his assistants, the largest number reported from any clinic. These cases with very few exceptions were operated by the inferior or sacral route. In a number of instances the abdominal incision was combined but only as an aid in checking uncontrollable hemorrhage. He reports one case in which 17 cm. of bowel were successfully removed by the sacral incision. Kupferle⁹ reports 238 cases from the Heidelberg clinic of Prof. Czerny, all of which were performed by the sacral route.

Hartman and Quenu¹⁰ in 1897 and Rehn,¹¹ Kraske¹² and Jonnesco¹³ in 1900 advocated the abdominal incision to tie off the superior hemorrhoidal artery and to determine the extent of the disease. Since that time there has been a growing tendency toward the combined operation. Kraske in a recent paper has advocated the combined operation in selected cases—those lying high in the rectum.

No single operative procedure for all cases of cancer of the rectum should be advocated to the exclusion of all other methods. Each case should be studied with the possibilities of permanent cure, mortality rate and a functioning anus or the best substitute. The perineal, sacral and vaginal routes are best employed in early and in low-lying growths in which anal sphincter control can be preserved. Kraske, Quenu, Mayo,¹⁴ Tuttle,¹⁵ Kuemmel,¹⁶ Schlopfer,¹⁷ Rotter¹⁸ Lusk¹⁹ and Bloodgood,²⁰ are among those who advocate the combined route in selected cases.

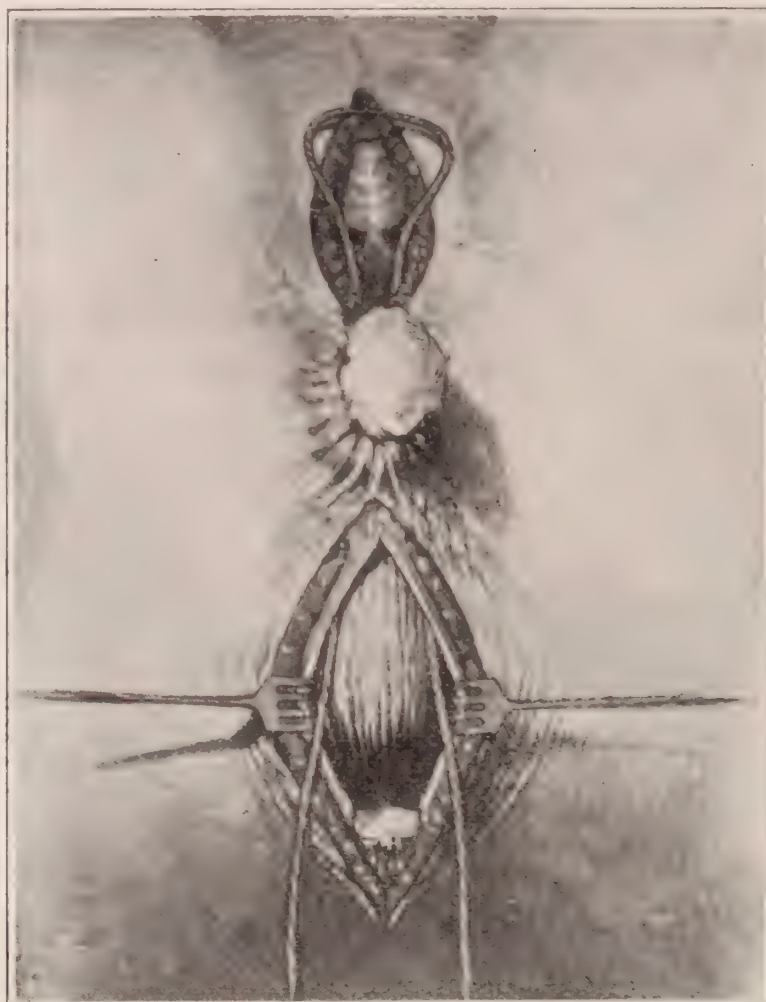


Fig. 1.

The advantages of the sacral route are:—

- (a) Rapidity: the operator at once upon the region of the disease.
- (b) Danger of infection lessened when peritoneal cavity not opened.
- (c) Time to complete operation less than by combined method.

The disadvantages are:—

- (a) A bloody field from hemorrhage difficult to control.
- (b) Extent of disease not readily determined because of the bloody field; infected glands high up either escape notice or are out of reach.
- (c) Interference with the blood-supply of the stump in such manner that gangrene of the bowel follows with death by peritonitis.

(d) Often the bowel can not be drawn down and a sacral or gluteal anus must be resorted to.

(e) The surgeon at times is unable to determine the limits of disease until operation nearly completed; often found that the patient has undergone a mutilating operation which would not have been attempted had condition been fully recognized.

Kocher,²¹ Bardenheuer,²² Schlange²³ and Hochenegg²⁴ are inclined to favor the sacral rather than the combined operation. Kraske has recently stated that the only method of improving the present sacral method consists in combining the sacral and abdominal procedures and that this has been done frequently in the past in cases which were in extreme con-

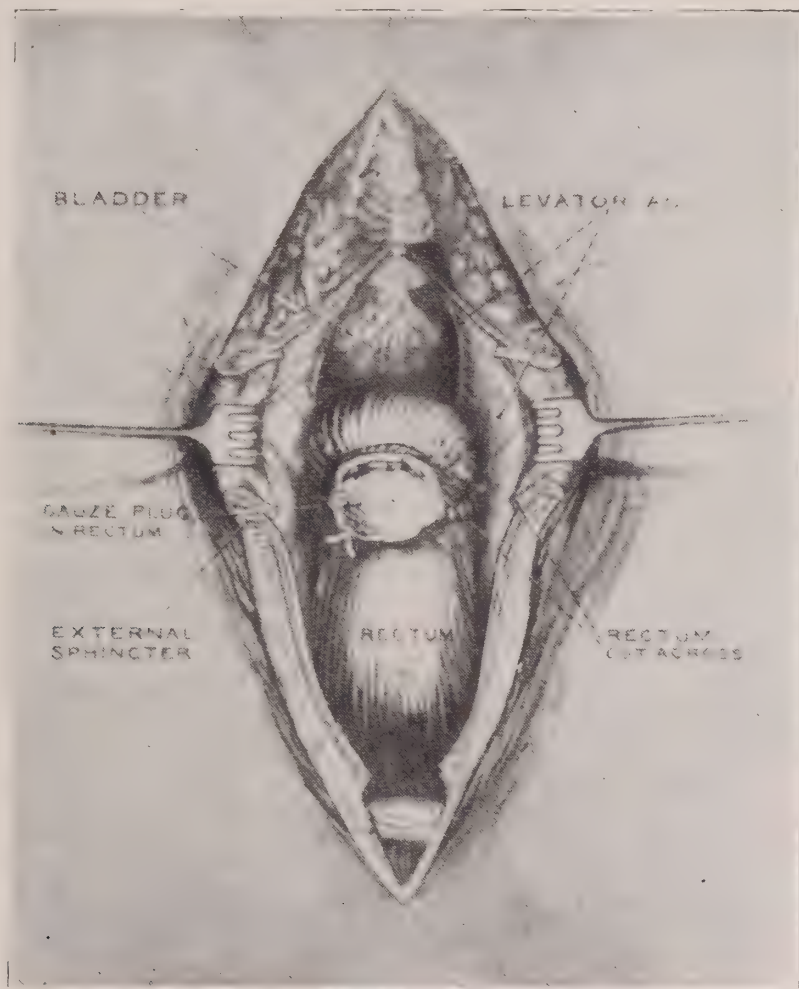


Fig. 2.

dition. It was realized that the sacral method was insufficient and as a last resort the combined operation was attempted. The high mortality rate of the combined operation is due in part to this factor. Kraske advocates the laparotomy to be performed first, designedly, and not as a secondary makeshift. When this is done the mortality of the combined operation approximates that of the sacral route and later should be lower. He maintains that the exploratory diagnostic worth of the abdominal incision is alone sufficient to justify combined operation.

Other advantages are:—

(a) Determination of extent of disease, both local pelvic condition and presence of distant metastases. Glandular involvement extending as high as the aorta not always determined by sacral route.

(b) Relations of the arterial system of the rectum. In dividing the superior hemorrhoidal artery to free the bowel and permit the stump to advance to site of new anus, certain vascular relations and variations must be recognized to avoid gangrene. There are some vascular arrangements that mean certain death from gangrene if ligation of the superior hemorrhoidal artery, at the usual level, is carried out.

(c) By the abdominal route the bowel can be loosened more thoroughly. Kuemmel in one instance mobilized the entire descending colon to overcome the defect caused by high amputation of the rectum.

(d) And finally, after the bowel has been freed and pushed down, the

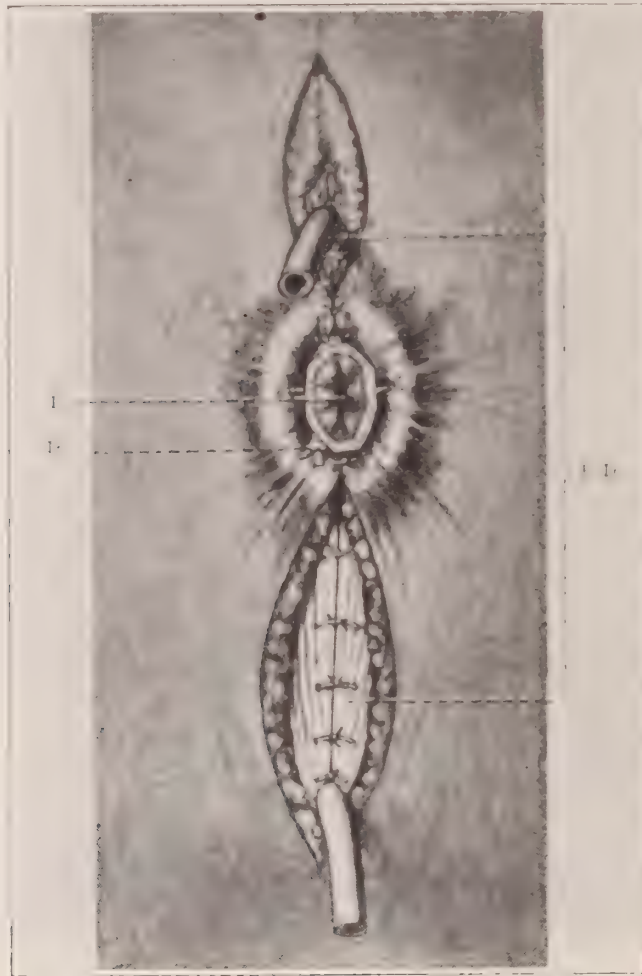


Fig. 3.

peritoneum can be sutured across the pelvis and the abdominal cavity walled off before the sacral route is attempted.

Having once accepted the combined route there remains the question of preservation of the sphincters by resection or by amputation of the diseased bowel and bringing the stump down to or through the normal anus. Zinner reporting Hochenegg's series, states that 62½ per cent. of the cases in which the bowel was drawn down and sutured in the anus, had continent sphincters while but 37.9 per cent. of those subjected to resection had continent sphincters.

Ball²⁵ has suggested an ingenious method of preserving the nerve supply which is the secret of a competent sphincter. It is best described in

his own words and by means of his illustrations. "The anal canal is plugged with gauze. An incision is made from the base of the coccyx to the back of the anus, and from the front of the anus to the urethral bulb. The coccyx is disarticulated and the levator ani and external sphincter muscles split to the back of the anus and from front of anus to the central tendinous point of the perineum. A stout ligature is, by



Fig. 4.—H—Superior hemorrhoidal artery. S—Sigmoidal artery. L—Anastomosing loop between sigmoidal and superior hemorrhoidal arteries. In this instance the sup. hem. artery bifurcates before the entrance of the anastomotic loop. If resection of the rectum is made below the level at which the two branches of the sup. hem. artery unite to form the vascular network about the rectum, the critical point is at B. If resection is done above the level of the arterial plexus then the critical point is A.

means of these incisions, placed round the rectum above the insertion of the pelvic diaphragm (see Fig. 1). The ligature is tied one-half inch above insertion of the pelvic diaphragm. Vertical incisions are made in the anal canal in front and behind, and the rectum is divided circumferentially just above insertion of the pelvic diaphragm. Each half of the pelvic diaphragm, and external sphincter muscle with its nervous supply

intact is drawn aside, giving free access to the rectum (see Fig. 2). The pelvic colon or rectum, as the case may be, is divided above the disease. The bowel (I) is retained at the anus by a few sutures and the anal canal closed by sutures. The pelvic diaphragm (P. D.) is closed both in front and behind by buried sutures (see Fig. 3)."

Wherever possible every effort should be made to retain the sphincters,



Fig. 5.—H—Superior hem. artery. S—Sigmoidal artery. L—Anastomotic loop. A—Critical point. Ligation of the sup. hem. artery above A admits blood to the sup. hem. artery by way of the sigmoidal artery and the anastomotic loop. Ligation of sup. hem. artery below A results in gangrene of bowel beneath, as blood supply from the middle and inferior hemorrhoidal arteries has been destroyed by the work done in the sacral stage of the work.

but in too many instances preservation of the sphincters has outweighed the possibility of leaving carcinomatous tissue in the patient. If we remove the tumor we must remove every portion of the rectum which contains any evidence or suspicion of malignancy, and all glandular involvement. Fortunately glandular disease occurs late and extends very slowly,

due to the presence of numerous glands at successive levels in the walls of the rectum and between the rectum and aorta.

In those instances where the sphincters must be sacrificed there remain a number of alternatives. Hochenegg has employed the sacral anus (the bowel terminating in back at side of sacrum) in a considerable number of cases and he maintains that fair control is obtained by means of a conical plug held in place by a support. Kraske, Wiesmeyer, Witzel, Peterman and Eiselberg²⁶ are doubtful of the value of a sacral anus.



Fig. 6.—S—Sigmoidal arteries. H—Superior hem. artery bifurcating high above entrance of L anastomotic loop. A and A'—Critical point according to where ligation is performed.

Witzel²⁷ has endeavored to obtain better control by drawing the bowel end through the fibres of the gluteal muscles and creating an anal opening in the buttock. This he has named a gluteal anus. This method has not given great improvement over the original sacral anus. Gersuny has twisted the bowel on its long axis giving the feces a corkscrew course in their descent. This has resulted in a somewhat better control.

Hartman, Quenu and Tarikato,²⁸ with others, have advocated complete extirpation and where sphincter control has been sacrificed they terminate the bowel in the left inguinal region at the site of the average colostomy. This has been termed an iliac anus. According to Bevan and Mayo the average individual when given the choice of determining whether the bowel shall terminate as an inguinal or sacral anus prefers the latter.



Fig. 7.—S—Sigmoidal arteries. H—Superior hem. artery. L—Anastomotic loop in this case is extremely rudimentary. It is questionable whether ligation above A would be safe.

This is probably due to the desire of the individual to have as near a normal condition of affairs as possible.

With an inguinal anus the sigmoid may be drawn through the abdominal wall and the entire rectum completely extirpated with blood-vessels, lymphatics and glands. By this procedure alone in many instances can we hope to eradicate the disease. Carcinoma of the breast was formerly treated in a manner that resembles some of the so-called conservative work on cancer of the rectum to-day. The modern radical

treatment of breast cancer has resulted in a greatly increased number of cures. I believe that where high lying cancer of the rectum is radically treated the permanent cures will be obtained most frequently by complete extirpation of the rectum with its surrounding blood-vessels, fat and lymphatic system, and that this can be accomplished in many cases only by the combined operation.

The mortality of the combined route varies with the sex—a low rate comparatively in the female and very high in the male. The female pelvis is larger and access to the sacral excavation is easier. The vagina offers a means of rapid freeing of the rectum in the sacral stage of the work. In the male the narrow pelvis and the relation of the prostate, seminal vesicles and urethra to the rectum make the operation exceedingly difficult. These anatomical differences are reflected in the statistics of several authors chosen at random:—

COMBINED ABDOMINO-SACRAL ROUTE.

	Sex.	Deaths.
Kraske.....	Men 7.....	4
	Women 3.....	0
Schlopfier.....	Men 13.....	8
	Women 10.....	1
Goullioud and Fayasse.....	Men 15.....	2
	Women 16.....	1
Ito and Kunika.....	Men 28.....	18
	Women 22.....	2

This gives a total of 51 women with a mortality of about 8 per cent., and a total of 63 men with a mortality of about 50 per cent. Hence, in estimating the danger of this operation we should take into consideration the sex as a very definite factor. In my own work I have done the combined operation in two women, both of whom are alive and in good condition. In the second case I carried the end of the sigmoid through the abdominal peritoneum, then made the openings in the internal oblique, external oblique and skin at successively higher levels so that the fecal stream follows a zigzag course and does not readily escape without knowledge of the patient. Absorption of fluid from the intestinal content is about complete in the sigmoid so that the feces are well formed, and slight pressure exerted on the skin lying above the bowel as it passes in its irregular course through the abdominal wall is sufficient to give an artificial control.

The border-line between low tumors to be operated by the sacral route and high-lying tumors to be treated by the combined route has been indicated by Bruening²⁹ as follows:—Where the upper margin of disease can be reached by the tip of the index finger, the case should be considered as a low-lying growth; all others are fit subjects for the combined procedure.

In closing we repeat the suggestion of Kraske, that the combined route offers a nearer approach to an ideal removal of the diseased tissue and that though its mortality has been high in the past this high mortality

is due in part to the cases in which it has been employed, cases in which it was seen from the start that a sacral operation was insufficient. As an operator repeats a difficult procedure he becomes more experienced and expert and his mortality rate decreases as the number of his cases increases. In reviewing the literature we find that this is true especially in the combined operation.

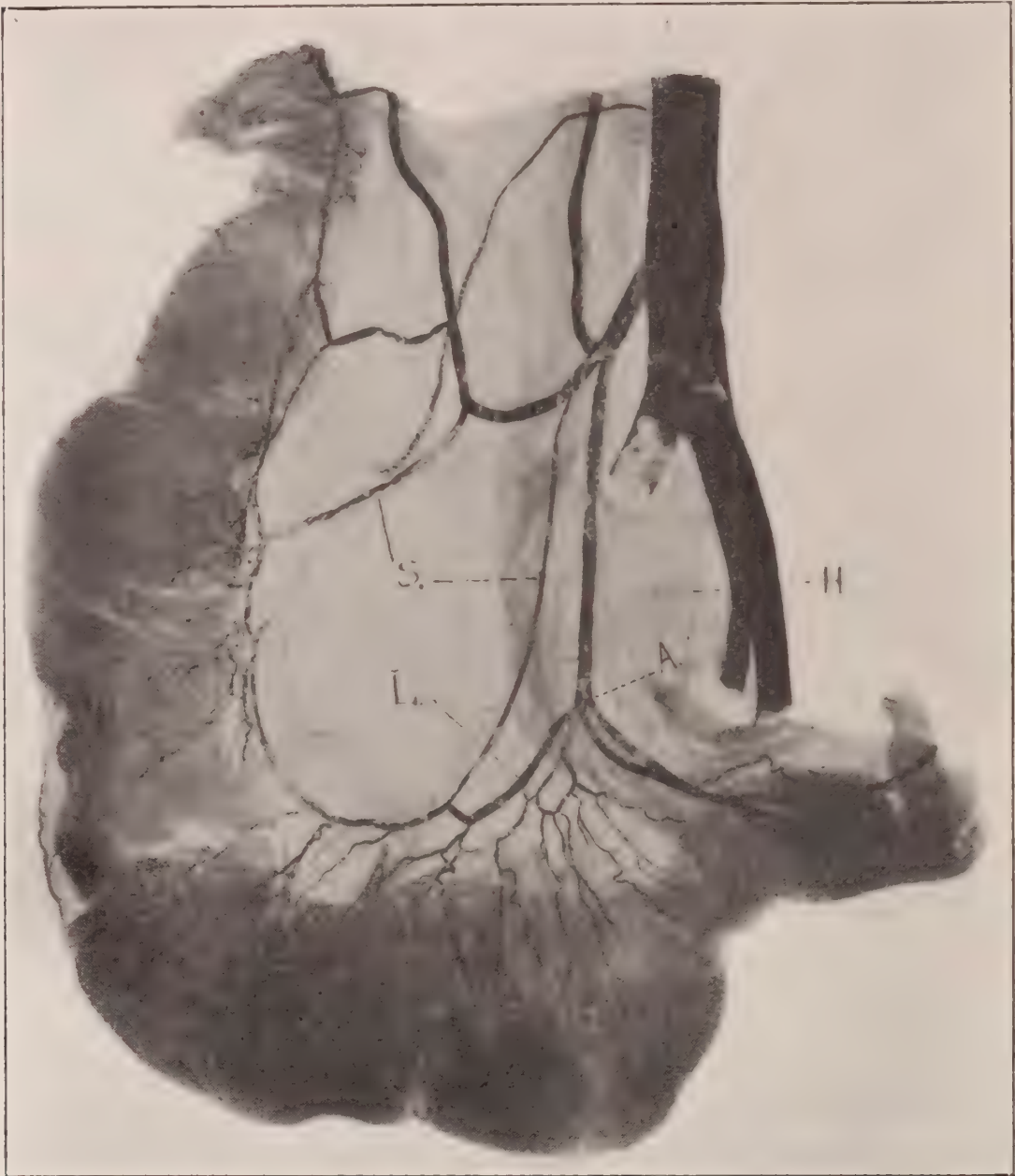


Fig. 8.—S—Sigmoidal arteries. H—Sup. hem. artery. L—Anastomotic loop. A—Critical point.

APPENDIX.

The repeated report of partial or complete gangrene of the bowel following resection of the rectum by the posterior or sacral method led the author to investigate the vascular relations of the lower bowel. Twenty-one subjects were examined. The vessels were injected with a starch-mass containing lead oxide. In some cases the vessels were dissected out to the bowel wall, while in others the relationships of the

vascular loops were determined by *x*-ray pictures. Some of the more interesting specimens are shown in the text.

Sudeck³⁰ and Rubesch³¹ have called attention to the loop which exists as a rule between the sigmoidal and rectal vascular systems. This is the last arcade or loop of the marginal artery. The point at which the loop anastomoses with the superior hemorrhoidal artery has been called the critical point. Hence, in ligation and section of the superior hemor-

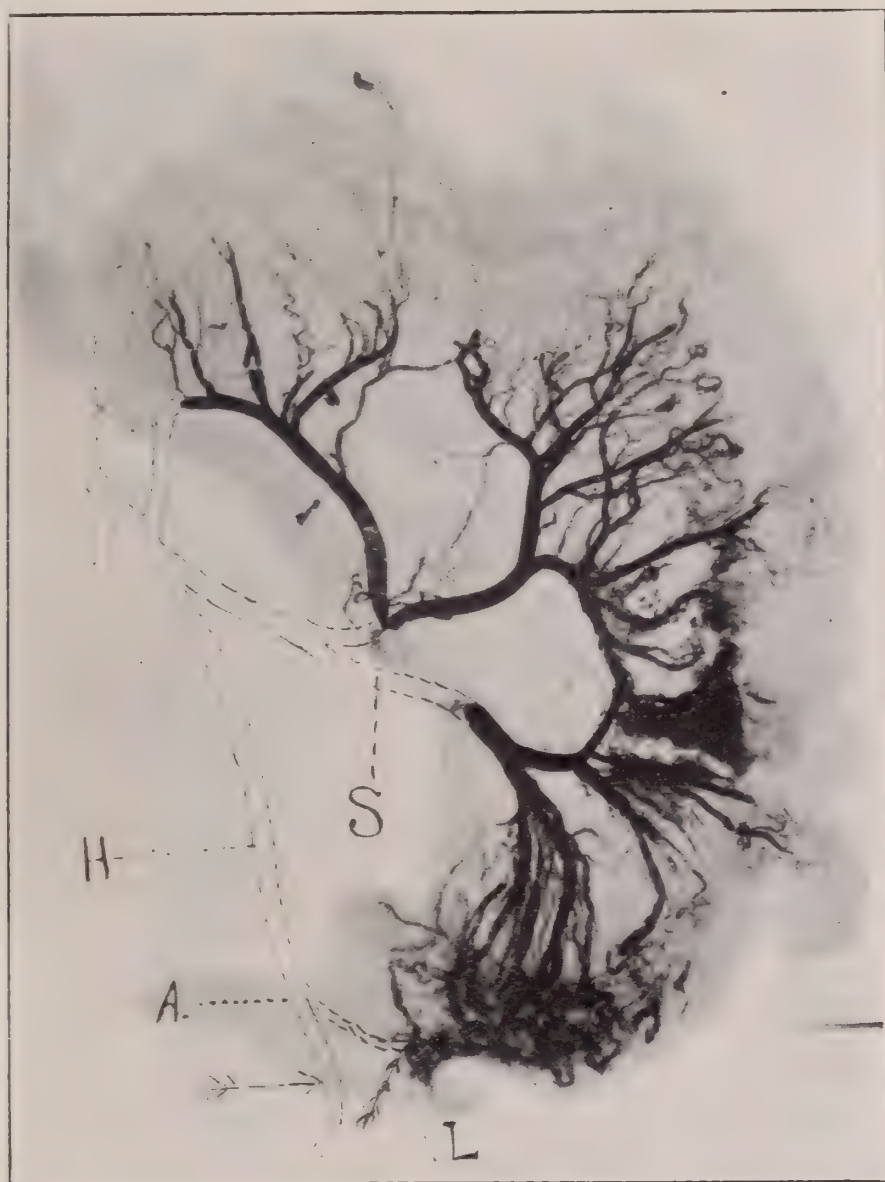


Fig. 9.—This photograph is of a specimen removed at autopsy. The patient died one week after resection of rectum for cancer. Ligations were performed by sacral route at levels indicated by arrows. Entire bowel sloughed below level of arrows. Had ligation been done above A, blood could have passed from loop into sup. hem. artery and bowel would have lived to point of resection.

S—Sigmoidal artery. H—Sup. hemorrhoidal artery. A—Critical point. L—Anastomotic loop.

rhoidal artery, to permit the loop of the sigmoid to be pulled down after resection of the rectum, it is essential that ligation be performed above the critical point (see Fig. 5, A), to avoid loss of blood supply and gangrene of bowel with subsequent death of the patient. Ligation below this point is a frequent cause of death in resection of the rectum as done by the sacral route. Fig. 9 is an *x*-ray photograph of specimen removed

at autopsy from a patient in whom ligation was made below the critical point or region where last collateral blood supply enters the superior hemorrhoidal artery. The superior hemorrhoidal artery was severed, as is usual, to bring down the bowel to the anus. By abdominal incision the location of the critical point can be better determined and the ligatures placed at the proper level.

In twenty-one subjects we found the loop present in 19 cases, and absent in 2 cases. The lowest loop was found in one subject with critical point almost in the bottom of the cul-de-sac of Douglas. Vast majority of other cases showed loop at about 1.5 cm. beneath the promontory of sacrum.

Sixteen subjects showed the loop close to the bowel.

Five subjects showed the anastomosis formed by large vascular loops at a distance from the bowel, demonstrating the value of the old rule to clamp as far back as possible from the bowel to save vascular relation while operating by the sacral route.

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REPORT OF A CASE OF EXCISION OF THE ENTIRE CLAVICLE FOR SMALL ROUND-CELLED SARCOMA, IN A CHILD NINE YEARS OF AGE.

By N. B. CARSON, M. D., of St. Louis.

In the year 1904 I read a paper before the American Surgical Association on removal of the clavicle, and at the same time reported a case of resection of the entire clavicle for sarcoma of the sternal end.

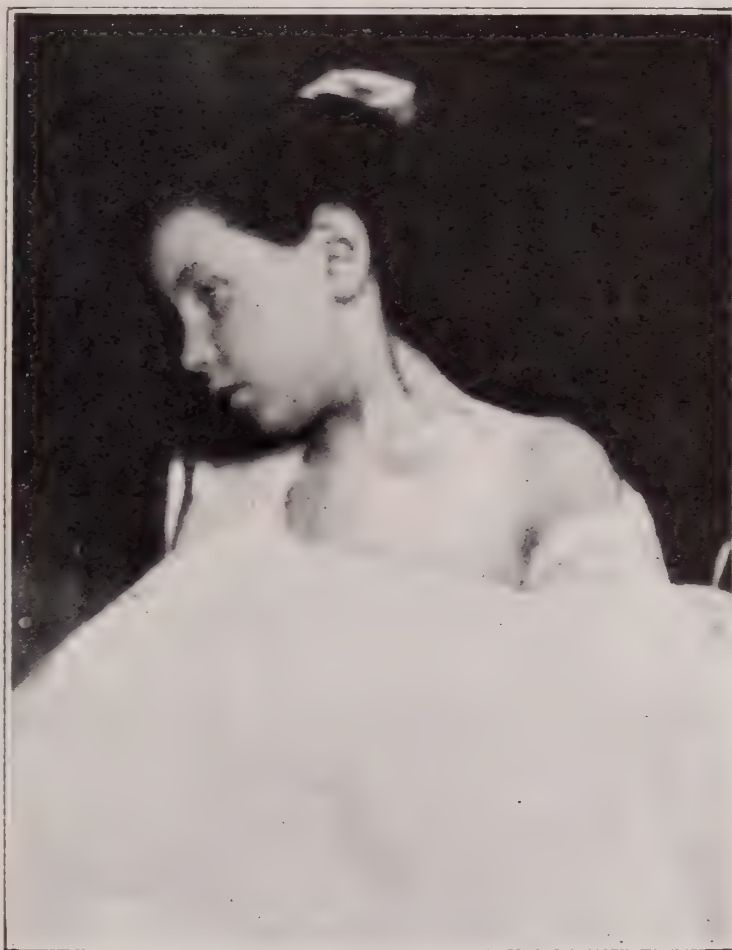


Fig. 1. Showing tumor before operation.

After a very careful search of the literature, on the subject, I was able to collect 49 cases, from all sources reported up to that time. Since then, several papers and reports of a number of other cases have been published, but I am sure that these reports do not include all cases that have been operated upon, as I am personally aware of cases that have not been included in these reports, and, no doubt, there are others that have never found their way into the journals.

Recently I have operated upon another case, in a child of nine years

of age, which involved two-thirds of the sternal end, and had its origin from the periostium.

It was about the middle of April, when I first saw the child at the



Fig. 2. Dotted lines show outline of tumor.



Fig. 3. Tumor bisected.

clinic at the Mullanphy Hospital, and advised that she be entered in the hospital at once; but it was not until May 1st that this advice was followed. In the meantime, the size of the tumor had very materially in-

creased, and after the child had entered the hospital and preparations were being made for the operation, daily increase in size could be noted.

The child was a well-developed, healthy, bright brunette, with a good family history. She had had some of the diseases of childhood, and also typhoid fever when five years old, but had otherwise never been seriously ill.

At the time of removal, May 5th, 1911, the tumor involved the sternal end, and two-thirds of the shaft of the left clavicle, and was about two and a half inches in length, and one and a half inches in diameter.



Fig. 4. Showing slight deformity twenty-one days after removal.

Fig. 5. Showing freedom of motion twenty-one days after removal.

The operation was done without complication, except for the division of a short vein connecting the tumor and the jugular vein, through which opening, air was drawn in, although the calibre of the divided vessel was very small. There was no apparent effect from this.

The child made an uneventful recovery from the operation, the wound healing by first intention except at the inner end, where on account of the thinness of the skin and tension, the sutures cut out, and as a result, this part of the wound healed by granulation.

On the eighth day after the operation, the child was able to feed her-

self with this hand, and on the twentieth day she had full use of the arm. There is very little deformity resulting.

Following is a pathological report made by Dr. Eugene Opie, which he has kindly allowed me to include in this report:—

The gross specimen consists of a tumor encircling the sternal end of the clavicle and approximately 4 cm. in diameter. On section, the bone is found to penetrate the centre of the tumor, and shows no break. The tumor is grayish white and homogeneous on section, forming a layer approximately 1 to 2 cm. in thickness on all sides of the bone. Microscopical examination section shows that the tumor tissue consists of masses of round cells, closely packed together. These masses are penetrated by a delicate stroma. In places the tumor cells form strands penetrating between fibres of voluntary muscle.

Diagnosis: Round-celled sarcoma of periosteum.

REPORT OF ONE HUNDRED CASES OF SYPHILIS TREATED
WITH SALVARSAN.

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I shall not attempt to go into the theoretical side of the subject of salvarsan, as we all know and have read so much about this interesting drug. I shall simply give you the benefit of my practical experience during the past five months, in which period I have devoted considerable time to the observation of these cases. The diagnosis in all has been confirmed either by positive Wassermann reaction or by the finding of the *spirochæta pallida* in the lesions.

Before giving you the results of treatment in these cases I shall briefly describe the different methods by which we administered the drug. At first we used what is known as the Alt method, which is a slightly alkaline solution diluted to 20 c.c. and given intramuscularly. This method proved so painful in the majority of our cases that we then used the method recommended by Kromayer, that is, suspension of salvarsan in from 1 to 2 c.c. of paraffin oil. The great advantage of this method over the alkaline intramuscular, is the almost entire absence of pain, but following this in a number of cases there were nodules varying from the size of a nut to that of an orange, at the site of the injection. In some cases the nodules persisted a long time. In one case, four weeks after the injection was given, a small abscess not larger than a bean appeared at the site of the injection. This broke and for two weeks a yellowish-white fluid discharged from which no bacteria could be grown. This patient at no time had any temperature and comparatively speaking no pain. We next tried the method which, I believe, was originally recommended by Neisser; the suspension of salvarsan in iodopin, which is a 10 per cent. iodine in sesame oil. We have been able to suspend salvarsan in from 1 to 1½ c.c. of iodopin. Thereafter following this method our patients experienced practically no pain and rarely a nodule remains, and the drug is absorbed much more rapidly than when suspended in paraffin oil. In the last 56 cases, I used only the intravenous method, as there are no after-effects and the symptoms of the disease seem to disappear more rapidly following this method, yet in almost every case there is more or less reaction. Within a short time after the intravenous injection most of our patients have a chill varying from a chilly sensation to that of a marked chill. The temperature varied from 100 to 103° F., reaching its height within six hours. Headache has been an almost

constant symptom, occurring a few hours after the injection but lasting only a very short time. Vomiting has been noted in about 40 per cent. of our cases, in one case so severe that the patient vomited considerable blood. In none of my cases have any of these symptoms been accompanied by any degree of shock. At the end of eight hours all symptoms have usually entirely disappeared and the patient feels as well as before the injection was given. The patients were kept in bed for twenty-four hours, after which time they went about their business as before. In the majority of cases the reaction has been very slight.

The three following cases are interesting if their symptoms are due to salvarsan.

First Case.—Immediately following the injection the patient had no symptoms of reaction and remained perfectly well for four days. On the fourth day the patient had a severe chill and vomited, temperature $103\frac{2}{5}^{\circ}$ F. These symptoms lasted about four hours not accompanied by shock, after which the patient was apparently as well as before.

Second Case.—Patient had slight reaction following injection and went home at the end of twenty-four hours. He felt perfectly well for four days. The fifth day, while eating in a restaurant, he had a convulsion, foaming at the mouth, and according to the person with him, resembling in every way an epileptic fit, although he did not bite his tongue. The patient remained in a semicomatose condition for about three hours after which he felt weak and exhausted, but otherwise there were no after-effects. The following day the patient was perfectly well, perhaps a little weaker, and for the last three months has had no return of the above symptoms. The patient gives no history of epileptic attacks.

Third Case.—This case is very similar to the previous one, except that on the sixth day after the injection the patient, while in a subway station, had an epileptic fit but did not bite his tongue. He remained in this condition about twelve hours not recognizing any one nor having any recollection of what happened. The next day the patient apparently felt all right and has been perfectly well ever since; now about two months. In both these cases the pulse at the time of the attack was about 80, practically no tension, that is, soft pulse; pupils were apparently normal, reacted to light. The urine in the first case was not examined, but in the second, he was catheterized and no albumin or casts found. None of my other cases has shown any late reactionary symptoms.

Regarding the technique of the intravenous method: Having dissolved the salvarsan in boiling hot water, neutralized it with normal sodium hydroxide solution, we diluted the solution to 250 c.c. Having inserted the Schreiber needle into the median basilic vein, we inject 20 c.c. of normal salt solution before injecting the salvarsan, the object being that in case there is any leakage around the needle it will infiltrate the tissues and the infiltration will be with salt solution and not with the irritating solution of salvarsan. When we have injected 20 c.c. of normal salt solution and

there has been no infiltration of the surrounding tissues, we feel sure that we can then inject the solution of salvarsan with practically no danger of infiltrating the tissues. Having injected the required amount of salvarsan, again we inject 20 c.c. of salt solution into the vein, so that in case there is any leakage after the withdrawal of the needle it will be salt solution and not the salvarsan. In the first few cases we injected sterile water instead of salt solution, but invariably there was more or less thickening of the vein at the site of the injection; since we have used salt solution no thickening has followed. I have found that where I inject 10 c.c. a minute there is no increase either in the tension or rapidity of the pulse from the beginning of the injection to the end.

Dosage.—Although the instructions on salvarsan are for intravenous injections, 0.4 grm. for men, and 0.3 for women, we have given much larger doses. I believe it is better to gauge the dose by the patient's weight. To men weighing 150 lbs. or over, I have given the full dose, 0.6 grm.; to women weighing 140 lbs., 0.5 grm., and smaller doses in proportion to the patient's weight.

In reporting these cases I shall divide them into the following groups:—

1. Where the chancre was present, no secondary manifestations. Diagnosis confirmed by excision of chancre and microscopic examination. I have had 3 such cases. In 2 the Wassermann reaction was negative, in one positive. An injection of salvarsan was given. The wound where the chancre was excised healed rapidly and so far has shown no recurrence. In the first case five months have elapsed since the injection, in the second four months, and in the third, two and a half months. In all these cases the Wassermann reaction is still negative.

2. Where the chancre is present accompanied with early secondary manifestation, the blood showing a positive Wassermann reaction. I have had 46 cases, in 20 of which it has been necessary to give a second injection. Of these, 15 had recurrences of manifestations within a month. The other 5 had positive Wassermann reactions at the end of a month, which in my mind was sufficient indication for repeating the injection of salvarsan. The effect of this drug on the primary lesion is very striking. Many times I have seen the chancre heal in from twenty-four to forty-eight hours, but the induration remains much longer, in some cases from ten days to two weeks. In 2 cases following the injection there was a slight improvement during the first two days in the chancre, but at the end of a week it was again ulcerated and larger than on the day I gave the injection. Ten days later I gave a second injection, and not alone were they healed over in forty-eight hours, but within three days the induration had practically disappeared. In one case of labial chancre the result was most brilliant. The following was the history:—

Mrs. S., sore on upper lip, size of a five-cent-piece, covered with a large black crust; ten weeks' duration. Face, trunk and extremities covered with maculopapular syphilides; ulcerating patches on tonsils. Wassermann reaction positive.

February 3rd, 1911, intravenous injection of salvarsan followed by slight chill; no temperature, no vomiting.

February 5th, 1911, two days after injection, chancre healed over, crust having fallen off. Induration greatly diminished. Skin eruption fading rapidly; mucous patches in mouth healed. Patient claimed that twelve hours after the injection she could swallow without pain, which she had not been able to do for three weeks.

March 1st, 1911, twenty-eight days later, patient had no symptoms. Second intravenous injection was given now, four months after the first injection, free of symptoms. Wassermann reaction negative.

The disappearance of the secondary skin eruptions vary greatly in different individuals. For instance, I have seen the macular and papular eruptions disappear in a few cases in twenty-four hours, but in others it has been persistent for a week and in some cases for ten days.

In the following case, January 25th, 1911, the patient had been suffering from sore throat for past month. He denies extra-marital intercourse. Physical examination; no chancre present; trunk and extremities covered with macular papular syphilides. Moist syphilides on scrotum, mucous patches in mouth; spirochæta pallida found in moist syphilides. Wassermann reaction positive.

January 27th, 1911, salvarsan.

January 30th, 1911, three days later, all maculars gone, also about two-thirds of the papulars; moist syphilides on scrotum and about the anus clean and healing. Mucous patches in mouth healed.

February 3rd, 1911, one week after injection, eruption entirely healed.

March 22nd, 1911, seven weeks later, no return of symptoms but has a positive Wassermann reaction; therefore, a second injection of salvarsan was given.

Salvarsan is of great value where mercury and potassium iodide will not control the symptoms. The following case demonstrates this point:—

Mr. S. C., aged thirty-four, primary lesion, September, 1910. Treated since then continuously with inunctions, injections of $1\frac{1}{2}$ grs. of mercury salicylate weekly and potassium iodide by mouth.

February 10th, 1911, five months later, although continuously under treatment, presents himself with face and neck covered with large papular squamous pustular syphilides, also moist syphilides on scrotum and about anus. Salvarsan injected.

February 15th, 1911, five days after injection, eruption on face very much better; moist syphilides on scrotum and around anus entirely gone.

February 20th, 1911, ten days after injection, eruption entirely gone.

March 16th, 1911, five weeks later, patient returns with beginning papular eruptions on forehead. Wassermann reaction still positive; gave second injection of salvarsan.

March 26th, 1911, ten days after second injection, all lesions healed.

April 19th, 1911, two weeks later, no return of symptoms. Wassermann reaction positive.

I have treated 6 cases of gumma of the testicles with salvarsan with rather brilliant results. In all of these cases the swelling had entirely disappeared at the end of a week. In 2 cases there remained a slight hard nodule in the lower pole of the testicle about the size of the end of the little finger where I imagine there had been more or less degeneration, and I concluded this to be scar-tissue that would never disappear.

In 5 of the 6 cases, the swelling at the end of forty-eight hours had diminished one-half in size. The other case showed no change in size for three days and then the swelling disappeared very rapidly so that on the eighth day it had practically disappeared.

I have treated 7 cases of periosteitis, 5 of tibia, 3 of which were bilateral, and 2 of the ulna. One case was in a child eight years old, congenital syphilis. Six of these cases had recurrences within a month, the seventh has remained free of symptoms. The most marked feature is the almost immediate relief from pain. The following history is very interesting:—

A child, eight years old, sickly since birth. One year ago mother noticed swelling, first in one tibia; a few weeks later swelling began on other side. The child was given tonics, mercury by inunctions, mercury by mouth and potassium iodide. At times the swelling would diminish but soon return, the pain always remained. For the last seven months the child has been unable to walk on account of the severe pain in its legs, she was either carried or wheeled in a chair wherever she was taken. The blood-examination showed a positive Wassermann reaction. The child weighed 40 lbs.; therefore, I gave her 0.2 grm. of salvarsan. Two days later the mother brought the child to me and she walked into the room. The swelling had greatly diminished in size. The improvement continued for a month, at the end of which time the mother brought the child back showing me a small swelling beginning in the upper third of the tibia. She said that she thought the child had been running around too much, something she had not been able to do for over a year. Unfortunately it was a recurrence and I advised a second injection.

I have seen 5 cases of gumma of the tongue; in one case the patient had a recurrence at the end of three weeks, the gumma never having completely healed, but three days after the second injection the lesion was entirely healed; and now six weeks after the last injection the patient has a negative Wassermann reaction and no sign of recurrence.

The other 4 cases are still free of symptoms.

I have treated 2 cases of gumma of the iris, which were examined by Dr. Reese both before and after the injection of salvarsan. In each case the gumma had been entirely absorbed and the iris appeared normal at the end of forty-eight hours.

What is commonly called "gumma of the iris" is in reality a papular syphilide, that is, a secondary manifestation.

I have treated 2 cases of syphilitic iritis. In both cases the pain was relieved within twenty-four hours and the iris was pronounced normal; in one case at the end of six days, in the other at the end of eight days. In one case, two months after the injection, the patient developed an iritis of the other eye and required another injection.

Therefore, in my experience with salvarsan, following the first injection, I have seen 23 cases in which recurrences of the symptoms appeared; in these cases the blood gave a positive Wassermann reaction. In 6 other cases, although there were no recurrences of symptoms, the blood examination at the end of a month gave a positive Wassermann reaction,

making in all 29 cases which were not cured by the first injection; but, as far as I have seen, there have been but two recurrences after the second injection was made. As my experience has covered only the short period of five months, it is impossible for me to tell what these case will show in the future.

I believe that salvarsan is indicated in all cases of syphilis where there are any manifestations present or where the blood shows a positive Wassermann reaction, except for example in

- (1) Advanced disease of the nervous system.
- (2) Marked general debility.
- (3) Advanced cardiac disease.
- (4) Marked renal disease, unless it is due to syphilis.
- (5) Optic neuritis.

I have treated one case in which there was a beginning optic neuritis that Dr. Claiborne examined and has pronounced very much improved, following the injection.

CONCLUSIONS.

1., In all my experience with syphilis I have never found any drug which healed the syphilitic symptoms so rapidly and so satisfactorily as salvarsan. When you realize that the chancre, the mucous patch and condylomata lata are in the majority of cases healed over in forty-eight hours, and as these are the active carriers of contagion, you will readily agree with me that the spread of syphilis will be greatly diminished by the use of this drug.

2. From my experience, I believe that a second injection should be given practically to every case and that this should be given within three weeks after the first, except in those cases where following the first injection there have been some bad after-effects.

3. I prefer the intravenous method of giving the drug because the disappearance of the symptoms seems more rapid, there is no pain or any local irritation at the site of the injection, and the effects of the salvarsan have proved to be more lasting and the recurrences less frequent.

As to the absolute certainty of the cure, sufficient time has not elapsed to justify the conclusion that one or even two or three injections of salvarsan will prevent recurrences of the disease either of the secondary or tertiary lesion. Time alone will tell.

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MEDICAL AND SURGICAL PROGRESS.

SURGERY OF THE HEART AND BLOOD VESSELS.

A REVIEW OF RECENT LITERATURE.

By MALVERN B. CLOPTON, M. D., of the Editorial Staff.

1. Sutton: Injuries of the Heart. (*Brit. Med. Journ.*, Vol. V., p. 1273, 1909.)
2. Salomoni: Surgery of the Heart. (*Archives Générales de Chirurgie*, Sept. 25th, 1909.)
3. Kirchner: Treatment of Wounds of the Heart. (*Annals of Surgery*, Vol. III., No. 1, p. 96.)
4. Bernheim: Experimental Surgery of the Mitral Valve. (*Johns Hopkins Hospital Bulletin*, Vol., XX., p. 107, 1909.)
5. Bewley: Cardiolytic. (*Brit. Med. Journ.*, Vol. I., p. 915, 1910.)
6. Floeckner: Heart Suture. (*Muench. Med. Wochenschr.*, Vol. LVI., p. 1634, 1909.)
7. Poynton: On the Operation of Cardiolytic. (*Lancet*, Vol. I., p. 1740, 1909.)

In reviewing the surgery of the heart, one must recognize that up to the present the surgery of the heart has consisted almost exclusively of the treatment of injuries. The field which was opened in 1896 by Farina has up to date recorded 155 operations for injuries with brilliant results in 35 per cent. of the cases, this representing the work of many operators; and practically all of the recoveries were of cases that if left without surgical treatment would have died. For the past twelve years, the mortality-rate has not diminished, and, if there is to be a further improvement in the operative results, our aseptic technique will have to be further perfected as the cause of death in the majority of cases is pericarditis, pleurisy, or pneumonia. These facts have been brought out by Bland-Sutton and Salomoni and Kirchner. Apparently there is no generally accepted route for cardiac approach, but most of the authorities agree that the intercostal method is the most rapid and least mutilating and the simplest of the various methods suggested. The wound, if not large enough, is increased by disarticulating from the sternum one or two costal cartilages. At times, especially for wounds of the base of the heart, it is necessary to resect parts of the ribs and turn them back with the hinge at the sternum. The nature of the wound inflicted often determines the character of the operation. In the mind of most writers, drainage of the wound is considered unnecessary, although a large number of the cases that recovered were drained. (Out of 58 cases of suture

of the heart that recovered, drainage was employed in 30 cases.) Pericardial effusion is frequent after suture of the heart, and it determines the pericardial pain, anxiety and weakness. Various suture materials have been employed, but more recently, the preference has been for absorbable material. When the wound is finished, the stitches should be close enough to prevent further leakage. In many cases, the heart has stopped beating while the sutures were being introduced, but in most instances, slight massage will start the beats again. Injuries to the coronary arteries are usually fatal, but as the coronary arteries are not terminal vessels, their ligation is not contraindicated.

The next developments in cardiac surgery followed a suggestion by Brauer in 1903, who proposed the excision of the overlying ribs and part of the sternum for cases of adhesive pericarditis with angina and a marked diastolic precordial bulging with a systolic retraction. This measure released the heart from adhesion to the chest wall. Morrison, in 1908, suggested that in cases where the heart was greatly enlarged, for example, in aortic stenosis regurgitation with marked ventricular hypertrophy and anginoid pain, that the heart be released from too confined an area by removal of the ribs that overlay it. These suggestions have been followed by eighteen operations; mostly cases of adhesive pericarditis. The operations have varied in their methods. Through a curved incision, a large thoracic window is made by taking out the fourth, fifth and sixth ribs and cartilages, and sometimes the third and seventh. While the original suggestion was that the ribs be removed with the periosteum. Thorburn who has given us the last article on the subject, sees no reason why the periosteum need be removed; as in several of the cases, including one of his own, the ribs did not reform and in one of Koenig's cases where he left the inner layer of periosteum, he found two and a half years later when the patient died, that there were only a few bony spicules. General anesthesia has been used in most of the cases. Peterson and Simon started their first case under local anesthesia and had to complete it under general anesthesia. (The reviewer has on one occasion resected about six inches of the sixth rib under cocaine for relief in a case of mitral stenosis with a large heart, and much discomfort. It was possible to do this operation in a case where conditions were most unfavorable without any disturbance to the patient, and it appears a much safer procedure than to give a general anæsthetic.) Recently Bewley has reported a successful result in such a case as Morrison indicated should be operated.

Bernheim reports on the operative methods which he has used to attempt to narrow the auriculoventricular orifice, which is the most difficult of all valvular lesions to reproduce. This work was undertaken to answer Brunton's question, Can a mitral stenosis be transformed by surgical methods into an insufficiency with benefit to the patient? The question has not been finally answered, but on numerous occasions it has been possible on dogs to constrict the mitral ring by a suture, and in some of the cases it has been possible subsequently to divide the constriction; but they were not able to reproduce the typical presystolic murmur, or the usual symptoms characterizing the stenosis in man. Hence, the question of symptomatic benefit from this procedure still remains unanswered, for the lesion that have been made have merely led to a degree of stenosis to which the heart promptly accommodates itself. The work was done before Metzer's method of tracheal insufflation was devised, but the anesthesia was accomplished by intubing through a tracheotomy wound after the chest had been opened (since the heart has to be approached via

the pleural cavity). Artificial respiration was continued until the heart lesion was made, and the pericardium and pleura dealt with. The greatest difficulty encountered, in passing the cardiac ligature by which the stenosis was effected, was from wounding a coronary vessel or from tearing the cardiac muscle. A particular form of curved needle having an eye and a fixed handle similar to an aneurysm needle, was devised and proved to be more accurate in use. Silk that had been dipped in vaseline was used and passed beneath the coronary vessels so as not to produce a constriction and an infarct. Thirty attempts to produce stenosis have been made; two or three succumbed to post-operative shocks, a number died from empyema, a few at a later period from thrombosis formation, and ten recovered and lived from a week to three or four months. In only one case have they successfully reoperated for the stenosis, and in this case with perfect recovery.

A curved thin knife is passed into the apex of the left ventricle through the arms of an untied mattress suture; the stenosing ligature is cut and the knife withdrawn, the suture being immediately tied. This operation is easier to carry out than the stenosing operation; it takes less time, the hemorrhage is easily and accurately controlled, the post-operative vomiting is low. This is a point in favor of the future possible operation in man, and it is encouraging to think that in the event of such an undertaking, although we have to deal with a diseased and overburdened heart, the procedure offers no greater technical difficulties than a number of others which are in daily practice.

Carrel has been experimenting with the idea of finding such methods as could be used for the treatment of certain diseases of the heart and aorta. As very early diagnosis is now possible, it is probable the aneurysms of the thoracic aorta could be extirpated and the circulation reestablished by a vascular transplantation, if the proper technique was developed. It seems possible also that some valvular and vascular diseases of the heart might be improved by surgical therapeutics. The bad results following intrathoracic operations are due to a lack of adaptation of technique to physiological conditions in the chest. Pleural infections are the most dangerous complications. In 100 fatal cases of wounds of the heart treated by suture, death was the result of sepsis 60 times. It is therefore necessary to use in vascular and intrapleural operations better asepsis than is practised in many hospitals and laboratories, and the success of the more complex intrathoracic operations depends on the observance of a number of minute details of technique. The handling with forceps or retractors, the sponging or walling off with gauze, the exposing of large surfaces to the air, bring about irritations of the pleura and facilitate greatly its infection. As soon as the thoracic cavity is opened, the lungs must be covered with fine Japanese silk compresses impregnated with vaseline, as the silk tissue acts as a thin and almost impermeable membrane which protects the pleura without irritating it against the contact of the fingers, and permits of very efficient walling off of the operative field. In order to prevent the cooling of the pleura, a piece of thick flannel is placed on the silk compresses, and the temperature of the operating room is very high. Blood must not be allowed to flow through the pleural cavity as sponging to remove it may be a cause of infection. His operative results have shown that these precautions have brought about a great reduction in the mortality-rate in experimental work. The other complications which makes this surgery more difficult, is the respiratory disorder caused by the penetration of air into the thorax. In Carrel's

work, he has found that the intratracheal insufflation of Meltzer and Auer has given much better results than either the over- or under-pressure apparatuses devised to prevent respiratory complications. Working with the idea that some early aneurysms of the aorta can be extirpated, he has been successful in resecting this vessel and transplanting in its place a vein or other vessel which has been preserved in cold storage. It is necessary to modify the ordinary technique of vascular suture to meet the conditions in the aorta, and every detail of the technique must be directed toward the prevention of secondary hemorrhage which occurs more frequently after suture of the thoracic aorta, and rarely happens after suture of the abdominal aorta or other vessels. The main danger of the aortic operation does not come from the heart or from the aorta itself, but from the central nervous system. Spastic paralysis develops when the descending aorta has been clamped for more than ten or fifteen minutes due to a degeneration of the cells in the anterior horn. It seems that clamping of the ascending aorta cannot be continued without danger for more than one minute. Therefore, it is necessary to have a technique for the temporary diversion of the blood. One method is to lay the vessel open with a longitudinal incision and insert into its lumen a paraffined tube which is temporarily fastened. Then the wall of the aorta can be extirpated and replaced while the circulation goes on through the tube. When the operation is completed the tube is removed through a small incision. The patching or the transplantation of aortic segment can always be performed in less than an hour, while the circulation can go on for several days through the tube before coagulation occurs. It is a safe and convenient method for the descending aorta and can probably be used also on the ascending aorta. Another method of continuing the blood in circulation while segment of the aorta is being operated, is to establish a communication between the left ventricle and the descending aorta. One end of the vessel or of a paraffined rubber tube is inserted into the apex of the left ventricle and is fastened; the other end is inserted into the descending aorta, and the ascending aorta is clamped reversing the blood-stream through the upper part of the descending aorta. There is therefore no danger of anemia of the brain. The operation is difficult and the mortality heavy; nevertheless, he has succeeded several times in anastomosing the left ventricle to the descending aorta, and the circulation has been thus maintained for eight minutes. The clamp and tube were then removed and the circulation was reestablished in its normal direction. This method is more difficult and dangerous than the aortic intubation. In six experiments, the transverse suture of the descending aorta was performed after complete or incomplete section. One dog died of secondary hemorrhage a few weeks after the operation; the others recovered completely. The aorta was patched with a vein twice, both animals dying after eight and twelve days from secondary hemorrhage due to a necrosis of the flap in one, and tearing of the stitch in the other. Graft of a complete venous segment between the cut ends of the descending aorta was performed once, and the dog is still alive and in excellent health, and there is no modification of the femoral pulse. It seems possible that certain aneurysms of the aorta in man may be removed and replaced by a piece of vein with the help of the methods for temporarily diverting the blood.

Plastic operations on the heart are not much more difficult than on any other part of the body, according to Carrel, but to perform the operations without disturbing in an irreparable manner the functions of the nervous

system and of the heart itself is a very complicated problem. Of those operations which do not require temporary hemostasis, he has tried only one, which is an operation for mitral insufficiency performed without opening the heart. It can be done by resecting a part of the walls of the ventricle just below the coronary artery. A dog which underwent this partial ventriculectomy two months ago is still alive and in good health. Other operations which require a temporary hemostasis of the heart are only partially successful. He believes it would be feasible to cut a mitral or tricuspid valve, or to perform a curettage of the endocardial vegetations. The hemostasis can be secured by clamping the vena cava as advocated by Sauerbruch, but he believes it is simpler to clamp with a large soft-jawed forceps the entire pedicle of the heart, as the interruption of the circulation does not last more than two minutes, and it causes no cerebral complications. The main danger is the occurrence of fibrillary contractions which render almost impossible the reestablishment of normal pulsations. In operations which require interruption of the circulation for a longer time, he shows that as yet no method has been devised. The technique for these operations on the heart is very far from being developed, and the purpose of presenting them now is only to study some of the principles on which must be based the future surgery of the thoracic aorta.

THE SPINAL ARTICULATIONS, POSTURE AND STATIC DISTURBANCES.

A REVIEW OF RECENT LITERATURE.

By NATHANIEL ALLISON, M. D., of the Editorial Staff.

1. Redard: Traumatism of the Spine in Railway Accidents. (*Zentralbl. fuer Chir. und Mech. Orth.*, p. 74, February, 1910.)
2. Adams: The Functional Spine. (*Boston Med. and Surg. Journ.*, p. 80, January 19th, 1911.)
3. Engelhard: The Position, Form and Mobility of the Vertebral Column in the Sagittal Plane. (*Zeitschr. fuer Orth. Chir.*, Bd. XXVII., H. 1-2, 1910.)
4. Evans: Neglect of the Sacro-Iliac Joint by the General Practitioner. (*Medical Herald*, July, 1910.)
5. Hemmeter: Anthropometric Studies on the Osseous Proportions of the Human Body, with a View to Obtaining Mathematic Expressions for the Enteroptosis. (*Bost. Med. and Surg. Journ.*, October 6th, 1910.)
6. Rotch: The Comparison in Boys and Girls of Height, Weight and Epiphyseal Development. (*Archives of Pediatrics*, August, 1910.)
7. Goldthwait: A Plea for Greater Care in Arranging Patients on the Operating Table for the Prevention of the Common Post-Operative Weak Back. (*Journ. Amer. Med. Assoc.*, Vol. LVI., pp. 642-644, March 4th, 1911.)
8. Goldthwait: The Lumbo-Sacral Articulation, An Explanation of Many Cases of Lumbago, Sciatica and Paraplegia. (*Boston Med. and Surg. Journ.*, March 16th, 1911.)
9. Meisenbach: Sacro-Iliac Relaxation, with Analysis of Eighty-Four Cases. (*Surgery, Gynecology and Obstetrics*, Vol. XII., No. 5, May, 1911.)

Redard believes that traumatic hysteria of the spine is a very rare condition. This type of spine is often referred to as railway spine. He has seen but two cases and these presented deformities of the spine similar to those seen in hysterical scoliosis. Kummell's disease is distinct and different in its development and origin from this condition. He believes that Kummell's disease is usually a latent tuberculous spondylitis, the activity of which is started up by the trauma. This is followed by an increasing deformity and symptoms, also by disturbance and metabolism and pain. A radiogram is necessary to establish the diagnosis, and it should be taken under conditions which minimize the dangers of faulty interpretation.

Adams believes that a diagnosis of osteo-arthritis should not be made without verification of x-ray findings. The average person of the laboring class is, on the whole, rather tolerant to a moderate amount of pain.

After proprietary medicines and plasters have failed to produce permanent relief, he presents himself at a clinic and places his hand over the region of the lower dorsal and upper lumbar spine as indicating the area of his pain. This pain he describes as being in the nature of an ache, or a stiffness in attempting to straighten up from a stooping posture. He notices it most upon getting up in the morning. Examination shows a limitation of motion in the spine, as evidenced by flexion in all directions being stopped by muscle spasms. Forward and lateral bending are limited, but hyperextension is not limited. Many of these men are teamsters, engineers, tailors, etc., the character of whose work necessitates the constant use of their back muscles, the strain being often increased by sudden change in temperature and exposure to heat and cold. Adams reports 25 routine cases treated at the Boston Dispensary. All of them presented the classical symptoms: pain, muscle spasm and limitation of motion, in varying degrees of intensity, and in all of them the *x*-ray showed nothing. In these cases a marked hyperemia was produced by local plastering and application of heat, and a light pelvic belt was supplied as an adjunct to the treatment. Adams is against using rigid apparatus, with its untoward effects on these cases. He believes that unless the back shows the symptoms, and unless, also, the *x*-ray reveals an osteo-arthritis, these patients will do better with light support and counter-irritation.

Engelhard gives a method of distinguishing the normal from the pathological vertebral column. Examinations were made of healthy children between six and fourteen years, in profile, by an apparatus which projected the spinal column as a whole, or in segments, on a glass mirror. This device is made by a straight rod, at the ends of which are two short rods of equal length, at right angles to the first rod. The end of one of the short rods touches the spinous processes and the corresponding end of the other short rod records a mark on the mirror. He has used the first cervical, the first thoracic, the first and fifth lumbar vertebræ and the beginning of the anal fold, the claviculo-sternal notch, the xiphoid cartilage, the umbilicus, the symphysis, the anterior-superior and the posterior-superior spinous processes and the trochanter as landmarks. All these points were brought into relation with a perpendicular erected at the middle of the trochanter and variations from this perpendicular were noted. The position of the spine in extreme forward and in backward bending was noted. In examining the segments of the spine, a line was stretched over the segments and the perpendicular dropped from the height of the arch thus formed, resembling a bow. In this way an average was obtained of the amount of curve in numbers of such segments. The curves of the spine are in intimate relation with the angle of inclination of the pelvis, which Engelhard found to be 32 degrees. The normal height of the arch of the lumbar vertebræ is 2 to 5.5 cm.; in extreme backward bending 4.5 to 6.5 cm. In the thoracic segment the height is 7 to 11 cm.; in forward bending 18 to 41 cm., and in backward bending 2 to 7 cm. Though the author has not arrived at any definite conclusion from his measurements, he has given us a method of determining the type of spine possessed by any case under examination and has pointed out the advantages of calculating the spinal curve in studies which involve the consideration of enteroptosis and static disturbances.

Evans calls attention to the fact that the medical profession in general has not as yet recognized the disturbances caused by injury, or diseases of the sacro-iliac joints; also that the anatomy of the joint is not

very fully given in any English or German works. The French, however, have studied it very carefully, on account of their frequent employment of symphyseotomy, the sacro-iliac joints are true diarthroses, which permit a rotary movement of the sacrum between the two ilia. This joint is liable to strain and produces symptoms such as pain, either local or referred, swelling, abnormal mobility, or limitation of movement.

Hemmeter states that enteroptosis is not limited exclusively to displacement of viscera in the abdomen, but includes also the thoracic organs. He believes it to be an expression of congenital osseous, visceral nerve and vasomotor abnormality. Acquired enteroptosis is comparatively rare, and then only shows displacement of a few organs in the abdomen. In the acquired form the thoracic organs, as a rule, are in normal position, while in the hereditary, and more frequent type, the thoracic organs also are displaced; the bony proportions of the body are decidedly abnormal.

Rotch, in an interesting paper on the development of the boy and girl, comparatively speaking, shows that the girl passes the boy at puberty and reaches the period of full development prior to the boy. When about seventeen, the boy passes the girl in height and weight, and the epiphyseal growth in girls is in advance of that of boys from the first year until the sixteenth or seventeenth year, the girl maturing sooner than the boy. He insists that there is a marked correlation between the mental and epiphyseal development, and that girls and boys should be graded according to the stage of their epiphyseal development.

Goldthwait, in his plea for greater care in arranging patients on the operating-table, calls attention to the fact that the position in which the patients are placed at the time of the operation has much to do with the presence or absence of post-operative backaches and subsequent weakening of the sacro-iliac joints. The positions in which strain will not take place are so easily obtained that there is no possible excuse for such harmful conditions occurring. He shows an apparatus in which the lithotomy position can be maintained indefinitely, without either strain to the patient or to the assistant. This strain is caused by sharply flexing the thigh, and at the same time abducting it. The assistant is apt to rest his weight on the leg as he reaches over to assist the operator. In order to correct this strain, the thigh should be less sharply flexed, and a bandage, or strap, should be attached about the knees, to prevent marked abduction. Also in the ordinary flat position on the operating-table the thigh should not be hyperextended, thus drawing the axis of the pelvis forward. This can be prevented by placing under the back a support, which prevents the sag of the spine, and one also under the knees, so that hyperextension is prevented. Observance of this simple suggestion will relieve many patients of the extreme and lasting backaches which follow long operations in the recumbent position.

The same author in a paper on the lumbo-sacral articulation, makes it clear that this joint varies greatly in its stability, depending upon peculiarities in the formation of the articular processes and of the transverse processes, and that these peculiarities not only result in less than the normal strength of the joint, but may represent mechanical elements which not only produce strain and cause pain, but may lead to such great instability that actual displacement of the bones may result, with, at the same time, a separation of the posterior portion of the intervertebral disk. In such displacements, if the fifth lumbar slides forward upon the sacrum—spondylolisthesis—the condition is usually compensated for and pressure upon the cauda equina, or the nerve-roots.

does not occur. If the displacement be upon one side, the spine must be rotated and the articular process of the fifth is drawn into the spinal canal with such narrowing that paraplegia may result, or the crowding backward of the intervertebral disk alone may be so great as to cause similar paraplegia, but of more gradual development. Weakness of the joint, or partial displacement may cause irritation of the nerves inside or outside the canal, and produces bilateral leg pains, often called sciatica. This observation is based upon the history and development of an individual case that presented the dislocation of the lumbosacral articulation, with a **complete paraplegia**.

Meisenbach, in a very comprehensive article, covers the whole subject of sacro-iliac relaxation in a very thorough manner, taking up the anatomy, the case-history and therapeutics of this condition. He has observed 84 cases and has drawn the following conclusions: The sacro-iliac joint is a true joint and normally admits of some motion. It may be subject to strain, or complete subluxation, as well as to the diseases which affect other joints. The pelvic girdle is the main support of the trunk, and when relaxed, either by disease or physiological processes, the sacro-iliac may become loose, or subluxed. Many cases of sciatica are due to slipping of the sacro-iliac joint, and many backaches, especially in women, are caused by sacro-iliac strain. Faulty attitude and flat-foot may be causative factors. The degree of motion in the sacro-iliac joint varies greatly. Motion is usually more marked when the patient attempts to walk, a pendulous abdomen may strain the joint, giving rise to subjective symptoms. Direct or indirect muscular violence is one of the common causes of strain in these joints, as is likewise a general debility, whether due to the weakening results of disease or general suboxygenation. Gynecological cases which present symptoms of backache which have not been relieved are very often the result of trouble in the pelvic girdle. The diagnosis in these cases must be carefully made with due reference to paramount symptoms, the analysis of which may help to establish the diagnosis. In cases presenting vague symptoms of backache which cannot be accounted for, a thorough physical examination may disclose the chief trouble to be in the sacro-iliac joints. Early diagnosis in cases with mild symptoms is important, as chronic invalidism and neurasthenia may thus be prevented. In the acute cases, with sharp pain and spinal curvature, early treatment may give immediate relief. All cases of sacro-iliac relaxation should not be treated dogmatically by fixation. Sacro-iliac strain is more common than is generally supposed, and is found in both old and young. When existing, patient will not make a permanent recovery until the pelvic girdle has been properly supported and the joint strain relieved.

THE TREATMENT OF UNDESCENDED TESTICLE.

A REVIEW OF RECENT LITERATURE.

By JOHN R. CAULK, M. D., of the Editorial Staff.

1. Moschcowitz: The Anatomy and Treatment of Undescended Testicle; With Especial Reference to the Bevan Operation. (*Annals of Surgery*, December, 1910.)
2. Katzenstein: Kryptorchismus. (*Zentralblatt fuer Chirurgie*, No. 31, 1910.)
3. Davison: Surgical Treatment of Undescended Testicle. (*Surgery, Gynecology and Obstetrics*, March, 1911.)

Judging from the numerous operations which have been proposed for the relief of undescended testis, it is evident that an ideal method has not been obtained. The operation which has enjoyed the best favor and has secured the most satisfactory results is the one proposed by Bevan in 1903. Within the last year, Moschcowitz has reported a series of excellent results which were obtained by this method. In spite of this and similar reports, we find that our supply has not been exhausted as a very ingenious method has recently been proposed by Davison of Chicago, which seems to be a most sane and scientific procedure.

Concerning the surgical pathology of this malady, a few words may not be amiss. The body of the testicle is usually smaller and softer than its fellow, but preserves the so-called testicular feeling. It is generally quite movable, and in many cases it has a distinct mesentery. The epididymis is as a rule well developed. The vas deferens is always of sufficient length. This is a very important point, as great stress has been laid on the vas deferens as an important factor in the retraction of the testicle after operation, but this has been disproved. The Bevan operation gives evidence that the vessels are at fault and as a rule the vas is not the offending agent. Katzenstein recently made the assertion that the vas is the important factor in the retraction of the testicle. The processus vaginalis has been claimed by some surgeons to be an obstacle to the replacement of the testicle at operation. Moschcowitz thinks this erroneous and gives the following reasons why:—

1. It does not take into consideration the different lengths of the sac.
2. The testis is in reality a retroperitoneal organ, and its motility cannot therefore be affected by something outside of it.
3. Even when the neck of the sac is freed and ligated, the testis is no nearer to the bottom of the scrotum than before.
4. The most practical of all, he says, that he has never found the sac to give him the slightest difficulty in mobilizing the testis.

The spermatic cord is usually spread out in a fan-shaped manner and as a rule is very delicate. The vessels are poorly developed. One of the most important observations and the one on which the Bevan operation is hinged, is that the spermatic vessels are deficient in length, and ap-

parently by the distance between the testis and the bottom of the scrotum. The scrotum varies in size, depending on the presence or absence of a hernia, and on the size of the hernia. The scrotum, however, usually adapts itself to circumstances and affords no obstacle to the operation.

Reasons for Operating.—1. Every undescended testicle is accompanied by a hernia, either actual or potential according to Moschcowitz, and this requires operation.

2. The undescended testis is more subject to trauma than the normally situated one.

3. The testis possesses two functions: The elaboration of spermatozoa, and the maintenance of the sexual characteristics. In the undescended testis it is thought that the spermatogenetic function is practically absent. This has been proved by Haines in experiments on pigs. However, the interstitial and Sertoli cells are thought to preserve the sexual characteristics. Therefore, the preservation of this function is an indication for a conservative operation. Whether or not the replacement of the testis within the scrotum restores its spermatogenetic function or not, is not absolutely proved.

4. The not infrequent development of malignant tumors in the undescended testis.

5. The liability to accidents, such as torsion of the cord.

6. Extension of a gonorrhea or a metastatic involvement from mumps is much more grave in the undescended testicle. Extreme youth is a contraindication to the operation. The age of selection for operation varies with different operators, from three to nine.

A brief résumé of the various operative procedures is as follows:

1. One of the first methods was that advocated by Langenbeck which consisted in massage, manipulation, and the application of a forked truss, to retain the testis. The results by this method were unsatisfactory, the truss causing much discomfort to the patient and retaining the hernia unsatisfactorily.

2. Orchidectomy has been done a great deal for this malady, but its objections are so apparent that they need not be mentioned.

3. Replacement of the testis within the abdomen with closure of the internal ring has been suggested and carried out. There is no advantage to this except that it cures the hernia, but the testicle is exposed to all the dangers which might befall a non-descended organ, and it is in a more dangerous locality for trouble to ensue.

4. *Shueller's Operation.*—It was thought that the open tunica vaginalis was the cause of the non-descended testis, and in this operation the peritoneal prolongation is divided at the internal ring and a new tunica formed by the lower part, the testis anchored to the scrotum by sutures. This is only applicable when the testis is already close to the scrotum. There are many modifications of this operation, such as suturing the fascial structures of the cord to the external ring and suturing the undescended testicle to its fellow on the opposite side after incising the septum scroti.

5. *Lanz's Operation.*—Sutures are passed through the testis. These are passed through the scrotum and left long and fastened to a wire cage or to the thigh, the idea being to exert continuous traction in order to lengthen the cord. This operation has many recurrences.

Starr fastens the testis to a wire splint which is fixed on one end to the pubic bone and at the other to the scrotum.

6. *Keetley-Torek Operation.*—This operation consists in liberating the

testis, correcting the hernia and the fixation of the testis to the skin-flap on the thigh with the idea that the fixation will lengthen the cord. At a second operation the scrotum and testis are liberated from the thigh and the testis replaced in the scrotum. This operation has a very uncomfortable post-operative course for the patient, on account of the traction and dragging on the testis, the very awkward gait, the eczema which often develops and the danger of infection.

The Beck necktie operation according to Moschcowitz at best can only hold the testis outside of the external inguinal ring.

7. *The Bevan operation*, which is the most familiar and the most satisfactory, consists in isolating and freeing of the hernial sac with closure of the peritoneal cavity in the usual way. The distal part of the sac may be cut off close to the testis, may be cut some distance from the testis and new tunica vaginalis made, or it may be inverted and sutured. The isolation of the sac is very important, as one has to be very careful in separating it from the vas, since the ultimate viability of the testicle depends upon the artery of the vas, and, if this is injured, the result will be necrosis of the testicle. Otherwise, as Moschcowitz has shown in his experiments, there is not a general necrosis but in some instances a slight central zone necrosis with the periphery in a fair state of preservation. The operation will not be described in detail. The substance of the operation being that the vessels are ligated and the vas left untouched, the vessels being the obstacle to the replacement. The work of Griffiths and Hill has shown that the artery of the vas is sufficient for the preservation of the testicle. The results of this operation have been very satisfactory. The testicle remains low in a great majority of the cases done by experienced operators and the results have been most pleasing.

Just recently Davison of Chicago has proposed the most ingenious method of dealing with undescended testicle. He recognizes as the main cause of the retraction, the shortness of the cord from its make-up at the internal inguinal ring to the testicle, and his method is a transplantation operation whereby the spermatic vessels and vas are brought together at the external ring instead of at the internal ring. Ligation of the vessels of the cord interferes with the lymph and nerve supply of the testicle; and he thinks if this can be obviated, as by transplantation, the preserving of the component parts of the cord means that a great deal has been accomplished. The operation is as follows:—

The inguinal canal is exposed by dissection as in the Bassini operation for inguinal hernia. The testicle and cord are freed. The posterior wall of the inguinal canal is treated very similar to the Fowler operation. After ligating the deep epigastric artery, an incision is made through the posterior wall of the inguinal canal from the external ring to the pubic bone, just beneath the site of the external inguinal ring. This destroys the internal inguinal ring and exposes the peritoneum with the vas and spermatic vessels riding on it. The vas is easily separated by gauze from the peritoneum until its desired length is obtained. The spermatic vessels are then sponged loose from the peritoneum by gauze carrying with them lymphatics and nerves which are preserved. A bed for the testicle is made in the scrotum and silkworm gut suture is passed through the gubernaculum testis and both ends are passed through the most dependent part of the scrotum. Testicle placed in the scrotum, the posterior wall of the inguinal canal is repaired, the cord is made to come through at the lower angle of the incision. The internal inguinal ring is closed, the conjoined tendon is sutured to the underside of Poupart's ligament

above the cord, the fascia of the external oblique muscle is sutured to the edge of Poupart's ligament above the cord, and the skin wound is closed. A strip of adhesive plaster is placed around the thigh just above the knee with a flap on the inner side of the thigh. To this is fastened a thin rubber band to which the sutures from the scrotum are tied with sufficient tension to make the band taut. A light plaster-of-Paris cast to prevent flexion of the thigh and intermittent traction on the gubernaculum is employed. Davison in his article presents three patients and his results seem excellent.

HAY FEVER.

A REVIEW OF RECENT LITERATURE.

By WILLIAM B. CHAMBERLIN, M. D., of the Editorial Staff.

1. Dunbar (*Deutsche med. Wochenschr.*, No. 9, 1903).
(*Berl. klin. Wochenschr.*, Nos. 24, 25, and 28, 1903).
2. Mayer (*New York Med. Journ.*, August 8th, 1903).
3. Rochussen (*Pharmaceutical Review*, XXVI., p. 167).
4. Semon (*British Med. Journ.*, I. p. 713, 1903).
5. Somers (*The Laryngoscope*, May, 1906).
6. Stein (*Chicago Medical Recorder*, February, 1905).
(*Chicago Medical Recorder*, July, 1908).
(*Interstate Medical Journal*, July, 1910).
7. Weichardt (*Berl. klin. Wochenschr.*, XXXVI., 1906).
8. Wolff-Eisner: Das Heufieber, p. 71. (*Internat. Centralbl. fuer Lar. Rhin.*, p. 402, 1905.)
9. Yonge: Hay Fever and Paroxysmal Sneezing. Wm. Green & Sons, 1910.

The near approach of the hay-fever season calls again our attention to that disturbing, if not fatal, periodic affliction and confronts us with two questions: (1) What is known in regard to the etiology of the disease; and (2) what advances have been made in its treatment.

The etiology of hay fever seems to be fairly well settled and may be stated in brief as follows: (1) An irritating cause, consisting principally of the pollen of certain grasses and weeds, included mostly under the order of Graminaceæ; and (2) an individual who is especially susceptible to this irritation. Many theories as to the cause of hay fever have arisen from time to time, but the pollen theory seems to be the only one which has stood the test of time and careful investigation. Leastwise, it is the theory which at present is most universally accepted. In regard to individual susceptibility, it is an undisputed fact that hay-fever victims are found in an overwhelming percentage among those in the better walks of life, among brain workers rather than manual laborers. In addition there seems to be some susceptibility which might be designated as an "hyperesthesia of the nasal mucous membrane to the pollen of various grasses." Of course such contributing causes as heredity, race, social conditions, as well as a more or less neurotic temperament should be taken into consideration.

The symptoms of hay fever are too well known, even to the laity, to necessitate repetition. In the United States the attacks occur at two seasons of the year: (1) The late spring or early summer, when they are usually known under the name of "rose cold"; and (2) in the late summer, usually beginning between August 15th and 21st, when they are known as "hay fever." An unfortunate complication of the latter variety, es-

pecially is a so-called hay asthma, which may cause even more annoyance than the hay fever itself.

The treatment of hay fever at the present time may be included under five heads: (1) The nasal treatment; (2) the antitoxin treatment; (3) serum treatment; (4) alcohol injections and cauterization; and (5) climatic treatment. No advances have apparently been made since the introduction of pollantin in 1903 by Dunbar, of graminol some time later by Weichardt, and the injections of alcohol along the nasal nerve and its branches, as suggested in 1908 by Stein.

(1) *Nasal Treatment*.—Many hay fever victims are the subjects of nasal malformations and new growths of various sorts. To say that the nose of every subject is abnormal, or that a nasal abnormality exists in every such case would be wide of the truth. The majority of such cases, if examined in the intervals, are found to possess nasal structures apparently normal in every way. Doubtless some nasal abnormality is found to be the underlying cause in a fair proportion of cases, such lesions being obstructive in character, as deflected septa, polyps and polypoid hypertrophies, or inflammatory, *e. g.*, diseases of the nasal accessory sinuses.

In a certain number of cases the correction of the nasal abnormality or cure of the underlying disease will serve to relieve the patient of his attacks. It should be beneficial in all cases. The cases should be carefully examined before the beginning of the expected attack so that there may be complete recovery from any operative interference before the attack has its incipency. It is superfluous to add that there should be no operative interference during the seizure. Yonge has reported certain good results from the bilateral excision of the nasal tubercle, though he considers that he has tried this procedure on too limited a number of cases to draw too general or definite conclusions.

(2) *The Antitoxin Treatment*.—In 1903 Dunbar, of Hamburg, first published his investigations in regard to a specific antitoxin, later introduced to the profession under the trade name of pollantin. Having previously convinced himself that the disease was due to the pollen of certain grasses, he succeeded in isolating a toxic albuminous substance which reproduced in animals symptoms similar to those observed in human beings. Later by injecting the pollen of certain grasses into horses, he succeeded in producing an antitoxin which, when introduced into the nose and conjunctival sacs of human beings during an attack, caused the disappearance or amelioration of the symptoms of the disease. Pollantin is obtainable in a dry, as well as a liquid form. The treatment in predisposed subjects should be instituted seven to ten days before the beginning of the attack and carried out during its progress. A general résumé of the published statistics shows good results in 62 per cent. of cases, fair results in 23 per cent., and no result in 15 per cent. The treatment should be carefully carried out according to the directions which are to be found on each package.

(3) *The Serum Treatment*.—Some time after Dunbar's investigations, Weichardt introduced a serum which is now known under the trade name of "graminol." "Weichardt believed that there existed in the blood of cattle, fed on the grasses ordinarily used for pasture, a substance which might be protective against hay fever. A serum was therefore prepared from the blood of such animals, without any previous inoculation or other preparatory treatment being practised." According to reports of the German Hay Fever Union there were favorable results in 75 per cent. of cases, while in 38 per cent. there was complete relief.

(4) *Alcohol Injections*.—In 1908 Otto J. Stein, of Chicago, reported favorable results from the injection of alcohol along the branches of the nasal nerve. The sensory nerves of the nose are derived anteriorly from the nasal branch of the first division of the fifth, posteriorly from the sphenopalatine ganglion. By injecting alcohol into or near these nerves Stein was able to relieve or ameliorate the symptoms in a certain proportion of cases. The technique of the operation presents considerable difficulty in certain cases. Such a procedure would doubtless decrease the sensibility of the nasal mucous membrane, an end which has been sought by other observers by means of cauterizing certain hypersensitive areas on the surface. Killian has cauterized certain areas, the anterior part of the septum, the anterior end of the middle turbinal, the outer wall slightly above the middle turbinal, and the upper part of the septum above the tubercle, with trichloroacetic acid with favorable results.

(5) *The Climatic Treatment*.—There are certain cases which none of the foregoing procedures seem to relieve. For such cases the only relief possible is the selection of some locality where the pollen season is later than at the permanent residence of the sufferer, and a sojourn there until after the first frost, when return is fairly safe. A sea cruise during the hay-fever season offers similar relief. These measures are attended with no little expense and inconvenience. For the individual of limited means they are quite impossible, and the only recourse is the avoidance, as far as possible, of all dust- or pollen-laden air, and the relief, as far as possible, of the various symptoms as they arise. Cities, especially the more densely populated districts, will accordingly be found more favorable localities than suburbs, country villages and towns.

Among agents which give temporary relief may be mentioned cocaine, eucaine, and adrenalin. The former may be mentioned only to be condemned. Whereas it undoubtedly gives temporary relief, the dangers, especially the cocaine habit, arising from its use make its employment impossible. Eucaine, while only half as toxic as cocaine, is a vasodilator rather than constrictor, so it does not give the relief derived from cocaine. It should be condemned for reasons similar to those applying to cocaine. Adrenalin, or the allied extracts of the suprarenal gland, gives marked relief, but unfortunately this relief is only temporary. It is a question, too, whether the congestion after the vaso-constriction has passed is not greater than that preceding its use. But this temporary relief is often a great boon to the sufferer and helps to tide him over until the time when the first frost eliminates the pollen and gives him relief.

PRACTICAL MEMORANDA.

SPINAL PUNCTURE AS AN AID TO DIAGNOSIS OF INTRACRANIAL INJURY.*

By VILRAY P. BLAIR, M. D., of St. Louis.

In suspected intracranial injury, valuable information is sometimes furnished by inspection of the cerebrospinal fluid.

The first puncture is to be made in the fourth lumbar space. If the fluid is deeply colored with blood, it shows profuse intracranial hemorrhage. The force of the stream sometimes gives evidence of the intracranial pressure. If the first fluid is slightly bloody and later it is less so, this is evidence that the blood is due to an injury in making the puncture. Therefore, the fluid should be taken in two tubes, a small quantity in each. If the fluid taken from the fourth space is clear or shows only accidental contamination, the needle is to be inserted into the second lumbar space where sometimes bloody fluid will be obtained; the removal of some of the fluid from the fourth space having allowed the blood to travel down the spinal canal. As in the first instance, this fluid should be gathered in two tubes.

The microscope is of little value in differentiating between accidental contamination from the puncture and contamination from the blood that is in the fluid before the spinal puncture is made, for upon examining the blood-cells which had been in the cerebrospinal fluid for various periods of time—from an hour to four days—no change in the form of the red corpuscles was evident. The microscopical examinations were made by Drs. Harris and DeWitt.

In severe intracranial hemorrhage it may be difficult or impossible to obtain any fluid by spinal puncture after twenty-four or forty-eight hours.

VENOUS TWIGS AT DIAPHRAGMATIC LEVEL, INDICATING HEPATIC SCLEROSIS.

By A. L. BENEDICT, M. D., of Buffalo.

This sign, reported by the writer some years ago, is often overlooked, although the caput medusæ at the umbilicus, occurring only in extreme cases, is classic. On exposing the chest, there is seen an approximately horizontal row of venous twigs, each dendritic form being one to three centimetres in diameter. The twigs are usually most prominent in the nipple line, diminishing toward the mid-line in front, and the anterior axillary lines. Communications between adjoining twigs are more or less marked.

The caput medusæ is due to the establishment of a collateral circulation between the paromphalic branch or branches of the left division of the portal trunk, via the round ligament and the epigastric terminals. The venous twigs at the diaphragmatic level are much more commonly seen—

*From observations made in the St. Louis City Hospital.

if looked for—or, in other words, they develop much earlier in the course of portal obstruction. The collateral circulation is by way of the accessory portal veins of Sappey, which drain the peritoneal folds and areolar tissue about the liver and communicate with the phrenic and azygos veins, and also through similar anastomoses of distal branches of the portal, ultimately affecting the terminals of the internal mammary vein, which penetrate the intercostal spaces and give rise to superficial venules and capillaries. Hepatic sclerosis affects the former route of communication negatively, except that the pre-existing normal flow has established a means of communication so that, although portal obstruction tends to diminish the flow toward the internal mammary via the phrenic veins, it also acts as a dam in both directions, and thus serves to divert the portal blood into the general venous circulation while favoring the distension of the twigs mentioned.

DRESSING FOR CIRCUMCISION WOUNDS.

By HERMANN B. GESSNER, M. D., of New Orleans.

On infants the dressing consists simply of a copious application of 2 per cent. carbolyzed vaseline, with a light wrapping of sterile gauze. At every change of the diaper the vaseline and gauze are renewed. On adults a dressing that is just where it is needed and nowhere else, that makes the proper degree of pressure and no more, is applied in the following way. The sutures of catgut when tied are cut long, say three inches long. A strip of gauze, long enough to more than encircle the penis, is rolled into a cord about $\frac{1}{2}$ inch in diameter, and one end is tied between the two strands of any one suture. It is then placed between the two strands of the next suture, which are tied down on it. This is repeated until the end of the gauze roll is brought around to the initial suture, between whose strands it is now again tied. Thus a gauze dressing is applied directly to the circumcision wound, on which it makes more or less pressure according to the traction made on it while tying down the suture strands. It does not interfere with urinating nor does it become saturated with urine. Removal is readily effected, after three days, by cutting the catgut knots that hold the gauze in place and soaking the penis in a basin of warm water. A strip of ZO adhesive makes a satisfactory collar at this stage of the case. This method is not original, being attributed according to oral tradition, to Wyeth of New York.

A CONVENIENT FORM FOR KEEPING BISMUTH-PASTE READY FOR USE.

By M. B. SEELIG, M. D., of St. Louis.

The following method of putting up bismuth-paste is convenient, and meets all the rigid requirements of strict asepsis:—Small collapsible tubes, such as vaseline is dispensed in, are procured. These tubes differ from vaseline tubes in that they end in a pointed snout, over which a protective cap screws. The tubes are sterilized by dry heat, and are filled with the paste, after it has been sterilized. The open end of the tube is closed by folding it on itself several times. The paste is used by removing the screw-cap, inserting the nozzle into the fistula, and forcing the paste in by finger-pressure on the tube.

CORRESPONDENCE

PARIS LETTER.

THE SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS.

By AUGUSTE A. HOUSQUAINS, M. D.

On account of the indecisive and slow methods pursued in the present-day treatment of pulmonary tuberculosis, the advanced minds in the medical profession are attempting to find a more radical and more rapid treatment to combat this disease.

To-day there has been added to the treatment by chemical agents, by serotherapy, by tuberculin-therapy, by vaccine-therapy, the surgical method, which, it may be stated here, is not in opposition to the methods that at present are enjoying considerable popularity. At first it was thought that the surgical treatment would interfere with all other forms of treatment, but this opinion has been dropped. Now though the surgical procedures differed from each other in a decided manner, the investigators who advanced the new treatment always kept before them theories which were in consonance with medical science. If the results of these divers treatments have not always fulfilled the hopes of the investigators, it would nevertheless be wrong to accuse them of experimenting blindly and without the help of ideas of a scientific nature.

In the first place let us mention the mask which Dr. Kuhn, of Berlin, invented and which rests on the principle of Bier's method. This mask allows the inspiration through the nostrils, the nose being slightly compressed, while the expiration is effected freely through the mouth, and in this way a hyperemic stasis of the lungs is brought about. Dr. Willy Meyer, of New York, asserts that by using the Kuhn mask he has produced in patients an increase of white corpuscles, hematin and hemoglobin. In connection with Dr. Meyer's statement it would not be inopportune to remember that in cardiac diseases, in which there is a passive pulmonary stasis, tuberculosis is of the greatest rarity. Again, the positive results of the sclerotic method in external tuberculosis should suggest the idea of using injections of sclerogen in the pulmonary parenchyma. Attempts have been made with these injections, but at the present time this method seems to have been abandoned in the treatment of pulmonary tuberculosis.

Freund's method reposes on an altogether different conception of the disease. This method consists in the rupture of the superior costal cartilage, and is based on the fact that at autopsies of patients, who were cured of a tuberculosis occupying the apex of the lung, an abnormal shortening of the first rib and its cartilage can often be seen, and the result

was a narrowing of the upper part of the thorax, which interfered notably with the expansion of the apex of the lung. This is even the case when the cartilage, instead of being contracted, is ossified. The obliteration of the superior costal cartilage is sometimes so marked that one can see traces of it in the form of a furrow in the pulmonary parenchyma. One can readily see that this interference with the filling of the lungs with air encourages the development of the tubercle bacilli. Hence the idea to practise chondrotomy of the first rib. It goes without saying that the indications for this operation are very restricted, and that the operation ought to be limited to the adult, and that it should be practised only after a diagnosis has been firmly established. As yet the results of this operation have not been published statistically; hence, the value of this procedure cannot be stated.

Another mode of operative treatment in tuberculosis is pneumonectomy, which has for its object the total suppression of the infected foci. In a recent work on the surgical treatment of pulmonary tuberculosis, MM. Tuffier and J. Martin make a plea in favor of this operation. Of course this operation, be it understood, applies only to unilateral tuberculosis, in which the foci are limited. Radiography furnishes the information which is needed before intervention is decided upon. Some typical cases have been published. Tuffier operated on a patient in 1891 who died, seven years after the pneumonectomy, from la grippe complicated by acute miliary tuberculosis.

As regards pneumonotomy, it is not necessary to say much, as the results have not been fortunate. This method has for its object the draining of the cavities of the tuberculous lung so as to disinfect them when the secondary infections cause a hectic fever. Put into practice, this method has proved unsuccessful, and it is highly improbable that it has any followers to-day.

The method which is much more interesting is the one which is called artificial pneumothorax, and which in France has led to a number of interesting investigations. The following will explain how the idea arose. A pulmonary wound constitutes a cavity that has no tendency to retract; not only do the movements of the lung prevent the coming together of the margins, but the constant exercise of a centrifugal force by the empty pleura tends on the contrary to enlarge the wound. Pneumothorax would seem, then, a priori to place a pulmonary cavity in the best condition, so that its walls can come together and cicatrize. It suppresses, in fact, all centrifugal traction and it impedes the movements of the lung. Clinical facts have shown that this action is real. The observations made in a number of cases in which there was a pneumothorax show a retardation in the evolution of pulmonary tuberculosis and a total modification of the symptomatic manifestations, provided the disease does not develop too suddenly.

Forlarini, of Pavia, was the first one to evolve the idea of systematically applying pneumothorax, created surgically, in the treatment of certain forms of pulmonary tuberculosis. The men, who in France have pursued this method, are MM. Dessirier and Dumarest, of Lyons, and P. Claisse, of Paris, the latter being the author of a paper read before the Medical Society of the Hospitals of Paris as well as of a number of articles published in medical journals; and M. Kuss, who is at present employing this method in the Angicourt sanatorium. In the course of a discussion on the scientific and practical treatment of pulmonary tuberculosis, a discussion which was published recently, M. Renon, professor of the Faculty of Paris, contributed an interesting study on the subject.

In principle, pneumothorax ought to lead to total immobilization of the lung, so that upon auscultation the vesicular murmur would no longer be brusque, but, on the contrary, slow and even. The tension should not be variable, a condition which can be achieved by the injection of a gas, generally azote, and which is introduced by means of a special apparatus (Forlarini's or Jeunet's, of Amiens). Certain authorities, such as Tuffier, Murphy, and Branca make an incision into the parietes in the intercostal space. In this way they get to the pleura, which they perforate with a blunt trocar.

The after-care of an operated patient should be closely followed so that the tension of the pneumothorax does not vary, and this is done even for months. Accidents are moreover possible, and it is well not to lose sight of these untoward occurrences.

When adhesions prevented the introduction of azote into the pleural cavity, Tuffier cut out a piece of the parietal layer of the adherent pleura. In this way he produced an extra-pleural pneumothorax in which, at the end of some days, after having sutured and drained the wound, he replaced the air by the introduction of azote.

The results of surgical pneumothorax are surprising. The local and general symptoms improve to such an extent that there is a complete transformation of the patient. As a means of studying the indications and the contraindications, the method should be employed more often, and the favorable manner in which it is regarded to-day gives it a high place in phthisiotherapy.

In those cases in which the adhesions render pneumothorax impossible, even when Tuffier's method is pursued, there has been proposed thoracoplasty, which consists in resecting a number of ribs so as to permit the free movement of the parietes. This method has been proposed by Friedrich, but it has not been favorably received in France. According to Tuffier and Martin the mortality resulting from Friedrich's method is so great that the method should not be encouraged.

Such, then, roughly speaking, is the present status of the question of the surgical treatment of pulmonary tuberculosis. Doubtless, in all the discussions as to the respective merits of the surgical or medical treatment, there is a certain degree of exaggeration. But since the phthisiotherapists limit themselves principally to serotherapy and vaccine-therapy in their treatment of pulmonary tuberculosis, would it not be well for them to add the surgical treatment to the aforementioned methods? While it is true that a number of the surgical procedures, which have been mentioned in this letter, are without practical value, the method of producing artificial pneumothorax should not be criticized in the same way, since the results, in the limited cases in which it has been practised, must be gratifying to all investigators.

July 10th.

DIAGNOSTIC AND THERAPEUTIC NOTES.

AN ABDOMINAL PRESSURE SYMPTOM OF SCIATICA.—Gara (*Deutsch. med. Wochenschr.*, 1911, No. 16). With the patient lying upon his back, pressure is exerted, by means of a finger, over an area extending from a finger's breadth below the navel to a point, at the same level, two fingers' breadths towards the side of the sciatica. At the other side of the median line, a similar pressure causes no pain. Gara has failed to elicit this sign in only 6 out of 124 cases of sciatica. He considers it a confirmation of his theory that sciatica is a disease, not of the sciatic nerve itself, but of the corresponding nerve-roots and the sciatic plexus. This also explains why constipation aggravates the pain, especially of left-sided sciatica, since here the overloaded rectum presses on the diseased left sciatic plexus; and also why local treatment directed towards the trunk of the sciatic nerve so often fails to accomplish results.

X-RAY TREATMENT OF MALARIA.—Skinner and Carson (*Brit. Med. Journ.*, Feb. 25th, 1911). The writers report 11 cases of malaria with marked splenic tumor treated by means of repeated exposures of this organ to x -rays. In all the cases, the fever subsided promptly, the spleen became smaller, and the parasites disappeared from the blood. The patients received no quinine. During the period of convalescence the patients did not show the anemia that often follows prolonged quinine medication. In a number of cases, in which quinine had proved ineffectual, the x -ray treatment was followed by prompt improvement. At present 5 cases of chronic malaria are under treatment by means of the x -ray; it is as yet too early to be certain regarding the outcome. The writers believe that the value of the x -rays in malaria depends upon the destruction by this means of the parasites, either directly or by means of some unknown action of the rays upon the blood. Clearly, their observations require confirmation.

SALVARSAN MILK.—Jesionek (*Muench. med. Wochenschr.*, 1911, No. 22). Early in the history of salvarsan it was noted that syphilitic infants, if nursed by syphilitic mothers who had received salvarsan treatment, showed a rapid disappearance of all manifestations of the disease. If directly injected with salvarsan, on the other hand, they often died. Ehrlich endeavored to explain this observation by assuming that, in the latter case, the rapid destruction of the parasites caused so great a production of their endotoxines, that the child succumbed. In the former case, however, the antibodies produced, by the treatment, in the mother's blood, passed into her milk and caused a gradual cure of the infant's disease.

Recent observations by Jesionek speak strongly against this hypothesis.

In the first place, chemical analysis of the milk of women recently treated with salvarsan invariably shows the presence of arsenic. It is therefore possible that the good effect of such milk upon the syphilitic infant may be due to the arsenic rather than to the hypothetical antibodies. In the second place, he reports 2 cases in which syphilitic infants nursed by recently injected syphilitic mothers, showed extreme exacerbation of their lesions, justifying the inference that endotoxines from the maternal spirochæta had passed into the milk and so into the child. This method of treating infantile syphilis is therefore not free from danger. These considerations led Jesionek to try upon a suitable case the effect of feeding the child with milk from a goat that had recently been injected with salvarsan. The effect was striking. Within a week the syphilitic lesions had nearly disappeared and twelve days after the beginning of the treatment no trace of the considerable syphilitic ulcerations was visible.

One swallow does not make a summer. Still in view of the facts that the milk of a syphilitic mother injected with salvarsan may be noxious, that the milk of human beings or animals injected with salvarsan contains arsenic in some unknown organic combination, and that such milk has been shown to exert a beneficial effect upon infantile syphilis, the method unquestionably deserves a trial. The technique is so simple as to be at anyone's command. A milch-goat is given 0.6 grm. salvarsan intravenously (a cow correspondingly more), and the milk is fed to the syphilitic child. If further experience demonstrates the value of the method, such milk, fresh or concentrated, will doubtless become an article of commerce.

SERUM DIAGNOSIS OF PREGNANCY.—Mosbacher (*Deutsch. med. Wochenschr.*, 1911, No. 22). There is good ground for the view that many of the accidents of pregnancy are anaphylactic phenomena, due to absorption by the mother of fetal proteid substances. The writer has investigated this problem by means of animal experiment. If a watery suspension of guinea-pig placenta be injected into a non-pregnant guinea-pig, the latter remains unaffected. A second injection, at a proper interval, however, promptly causes the animal's death, showing that it had been sensitized by the first injection. Pregnant guinea-pigs behave quite otherwise. In them a single injection usually proves fatal, always in early pregnancy, less and less so the more advanced the pregnancy. Investigation showed that, from the very beginning of pregnancy, these animals had become sensitized to placental proteid but that, as pregnancy advanced, antibodies were formed which in advanced pregnancy sufficed to protect the animal.

These observations suggest the possibility of a serum diagnosis of pregnancy. By means of the so-called epiphanin reaction it is possible to determine whether a specimen of serum comes from a sensitized human being or animal as the case may be. In brief, the method consists in mixing some of the serum to be examined with an emulsion of the tissue in question (in this case human placenta), and determining the change, if any, in the surface tension. The test can only be carried out by a specially trained man, but that is equally true of the Wassermann reaction. The time may come when the serum diagnosis of pregnancy will be as simple a matter as the serum diagnosis of syphilis. The test will be especially valuable as it will be most strongly marked in the earliest weeks of pregnancy, when all other signs fail us.

BOOK REVIEWS.

BIER'S HYPEREMIC TREATMENT. In Surgery, Medicine, and the Specialties. A Manual of Its Practical Application. By Willy Meyer, M. D., Professor of Surgery at the New York Post-Graduate Medical School and Hospital; Attending Surgeon to the German Hospital; Consulting Surgeon to the New York Skin and Cancer Hospital and to the New York Infirmary, and Prof. Dr. Victor Schmieden, Assistant to Professor Bier, University of Berlin, Germany. Second Revised Edition, Enlarged, Illustrated. Philadelphia and London: W. B. Saunders Company. 1909.

The above authors have translated this classical German work on hyperemic therapy into a very attractive English book. It covers the entire field of medicine and demonstrates the wide range and practical utility of hyperemic therapy. The systematic arrangement, the many illustrations and the exhaustive discussion of the indications and applications of the treatment are presented with surprising clearness. All the different methods of producing hyperemia are considered in detail. It is a book that should appeal to every branch and specialty, and one which can be heartily recommended to the profession.

A HANDBOOK OF PRACTICAL TREATMENT. By many writers. Edited by John H. Musser, M. D., L. L. D., Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia, and A. O. J. Kelly, A. M., M. D., Assistant Professor of Medicine in the University of Pennsylvania, Philadelphia. Volume II. Philadelphia: W. B. Saunders Company. 1911. Price, cloth \$6.00; half morocco, \$7.50.

This recent work on "Practical Treatment," edited by Kelly and Musser, is written by a number of authorities, particularly fitted to work upon the subject to which they have been assigned in these volumes. The two volumes cover the entire treatment, both medical and surgical, of every disease and its complications. The subject-matter is considered in detail and in a manner that bespeaks its thoroughness. The contributors to this work include over seventy of the most prominent authorities in this and other countries who are masters in this chosen field of work. It is probably the most exhaustive work dealing with practical treatment extant.

HYGIENE AND PUBLIC HEALTH. By Louis C. Parkes, M. D., D. P. H., Univ. of Lond., Consulting Sanitary Adviser to H. M. Office of Works, etc., etc. Fourth Edition with illustrations. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$3.50.

The fourth edition of Dr. Parkes' book has been carefully revised, and the new material which has been added makes it about as good a guide in the matter of hygiene and public health as anyone interested in the subject could possibly wish. The fact that this work has run through four editions indicates that it is being widely read; a deserving tribute, since it has all the qualities which go to the making of a work that is decidedly out of the common. Again, the fact that public hygiene is on the "carpet" at present should widen its circle of readers, especially as the presentation is interesting and to the point.

CASE HISTORIES IN PEDIATRICS. A Collection of Histories of Actual Patients, Selected to Illustrate the Diagnosis, Prognosis and Treatment of the Most Important Diseases of Infancy and Childhood. By John Lovett Morse, A. M., M. D. Assistant Professor of Pediatrics, Harvard Medical School; Associate Visiting Physician at the Infants' Hospital and at the Children's Hospital, Boston. Boston: W. M. Leonard. 1911. Price, \$3.00.

This is really a very valuable book. One hundred cases of various types have been selected and considered under the various headings of history, physical examination, diagnosis, prognosis, and treatment. The discussion of the cases is succinct, clear and always to the point. The value of case-teaching is now thoroughly understood, and this practical book of it on pediatrics is a valuable innovation. The book is sure to be widely read, and as widely appreciated.

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EDITORIAL.

BRIEUX'S MESSAGE IN DRAMATIC FORM.

According to a chronicler of the life of Saint-Simon, when this philosopher was still in his salad days, his valet was instructed to wake him every morning with the following words: "Levez-vous, M. le Comte, vous avez de grandes choses à faire aujourd'hui" (Arise, Count, you have important matters to attend to to-day); and, though we are not in the position to say that when Brieux was as young as Saint-Simon, his valet—if he had one, which we doubt, being a literary man—received like instructions, the thought which must occur to all thinking readers of his dramas* is that his active brain must have been cognizant for some time before he wrote, that certain important matters—suppressed chapters in our sociology—had either been overlooked by his fellow-writers or had been tabooed on account of the fear of ostracism that Puritanism plus hypocrisy always breeds. We are strong in this belief since no mind that had not studied society in all its aspects and in a way that was individual, and had not given the deepest thought to certain conditions which are generally supposed to be unspeakable, save behind closed doors and then only in whispers, could have struck a new vein so that the drama of to-day would no longer be the inept thing it is in the hands of the majority of writers, but a force out of which untold good could come. And in putting his theses in dramatic form, Brieux shows the acumen of the born reformer; for the drama is far better than dryasdust tracts or even the novel which holds one's attention for a time, since the *tout ensemble* of the stage conveys to the auditor of normal intelligence, impressions that he somehow never gets either from a superficial or deep

*Three Plays by Brieux. With Preface by Bernard Shaw. English Versions by Mrs. Bernard Shaw, St. John Hankin and John Pollock. New York: Brentano's. 1911.

perusal of prose in the privacy of his room. Of course, judging the dramas of Brieux by the canons of dramatic criticism which have been with us altogether too long, they are not in the first rank; but are we sure that our attitude in the matter has been correct, that what we thought right a decade ago should govern what is written to-day? Ibsen upset some of our cherished ideas with a ruthlessness that gave us a shock from which as yet we have hardly recovered; but what the Norwegian did was but a small, insignificant thunderbolt, for his truths never broke company with an idealism that was put forth as a sort of salve, whereas Brieux works in so clear an atmosphere and one so near the earth, that if idealism were temerarious enough to enter the lists it would soon be routed by the facts he presents. But in the columns of this JOURNAL, the controversy which rages in the realms of dramatic criticism, as to whether a drama should be a mere thesis or a literary offering that is not too entirely divorced from the mixture of romance, idealism and the pinch of realism that the modern public demands, is decidedly out of place; but what is in place is the recognition of the works of a master-mind who has written the most sensible words on just those subjects to which a large number of our medical writers at the present time are putting their talents, with what small success need not be commented upon here.

Now what is the great quality of these plays by Brieux? Whether we read "Maternity," "The Three Daughters of M. Dupont," or "Damaged Goods," the one thought which pervades all of them is this: Truth must be stated at all costs, no matter what becomes of good taste: that conventional bugbear of too many writers in the realms of good literature. For truth is all important, and if it is to be driven home there must be no whitewashing by means of good taste, since the process is a weakening one and the ends achieved spell failure.

This is a harsh way of putting things, but it is no harsher than what is contained in the medical article that is informed with the desire to instruct by the statement of bald facts ungarnished by opinions. And though we might say at first sight, that this sort of writing carries the greatest weight in medical literature but is not proper in belles-lettres, our second thoughts would soon teach us how mistaken we are, since the pursuit of truth cannot be effected in any other way. And truth it is that Brieux stands for in his plays, the truth that shall make clear to all, who know how to read, the real cankers that are causing the frets and worries, the physical and mental disasters in our present-day society.

On closing the book before us, the impression that remains is that the essential quality of this unusual writer is a "fine scorn of pleasing." Imagine a play that has all the terseness of a dovetailed conversation that limits itself to the subject in hand, and this with a directness that

refuses to tolerate the slightest deflection into idle talk, and you have the Brioux method. No matter whether the theme is syphilis as in "Damaged Goods," or the control of the number of children in a family as in "Maternity," or the deprivation of the right of motherhood as in "The Three Daughters of M. Dupont," the analysis of the sordid tragedy is brought about, not by the crude instrument that wobbles in an unskilled hand, but by tempered steel whose exquisiteness can be depended on to make such clean incisions that the social sore is soon exposed. Now this is just where Brioux towers above the medical writers who have attempted the same sort of thing, for though they know their subject as well as he, they fail to convince for the reason that they encumber their one thought, which alas! is never overstrong, with so much extraneous matter, in the way of unpractical opinions, that the reader's mind is quickly reduced to a blur that cannot possibly register a tenth part of their ideas.

The "unco guid" in the medical profession, and outside it, will no doubt show resentment to the writings of this very candid Frenchman; but even though this happen, the small number who are interested in the prophylaxis of social diseases and in other questions that are to-day inseparable from the practice of medicine, and who have had sense enough to keep this interest intact by refraining from indulging in maunderings in all sorts and conditions of medical journals, will undoubtedly proclaim him master. And well they might, for this free-lance is not one of those *litterati* who has merely dabbled in medicine so that sensationalism may be evoked, but a clear-eyed looker-on who relates things as they really are with a trenchancy and a sureness of touch that goes a long way in winning our admiration.

AN ACCOMPLISHED AUTOBIOGRAPHER.

The charm of a book is not easy to define, but when it once seizes upon the reader, a kindly attitude is his toward any defects which may occur. And it is well that this should be so, for if it were otherwise the good qualities would be belittled and the weak spots exaggerated. So it is right and proper that the charm of a literary production should get its meed of praise, and be so strong an asset that in the weighing of a book's worth a forefront position should be assigned it. Of course, in some books—those, especially, of a scientific nature—this prime quality may be lacking without any detriment to the value of the production, but this is not the case in the lighter forms of literature, particularly in autobiographies. Who has not read the lengthy self-portraits of all sorts of men and has not wished for some means of castigating the authors for an inveiglement that meant hours of boredom? And this state of de-

pression was not because the writer had not met interesting people, nor because his own life was not punctuated with some stirring events, but because "ill-educated conceit," to use a Ruskinian phrase, destroyed his sense of proportion and thrust him continuously in the lime-light of his own creation. Fortunately there are writers who are not guilty of this offense, and though their number is not startlingly large, it is not so small that one need despair of the sort of good taste that makes for charm in autobiographies. And to this small class belongs Dr. Robert Farquharson, whose recently published autobiography* it would be difficult to outclass on the ground of what should be the pervading spirit of a book if the reader's attention is to be held until the last page.

A canny Scotchman, indeed, is Dr. Farquharson and a close observer of the human procession. His humor is never absent, but it is never of the disagreeable sort that easily deteriorates into mordacity and a growl. The kindness of his brand is most engaging, and what with the shrewdness which is characteristic of the Scotch, the tale he unfolds is just the sort of delightful criticism that bespeaks a point of view of unquestionable originality. And this is evident whether the description centres around his home life during his childhood and schooldays, the celebrities of Edinburgh, the professors of Edinburgh University, or his life in London and the Continental capitals. But what is best, when this happy combination is present, is that the reader quickly arrives at the true measurement of the writer; for no romantic view of oneself can endure in the face of a judgment that is ever on the alert for human foibles. And here it would be well to remark that Dr. Farquharson's personality is never kept in the background despite his inherent modesty, but plays over all the pages as would a lambent light that illuminates without too much glare and sputter.

To select the best parts of this autobiography and reproduce them here would occupy too much space and, moreover, might be a disappointment to the reader; for only too often are excerpts completely emasculated by wrenching them from their environment. But though we hesitate to do this, the chapters devoted to criticisms of the medical men in the 'sixties of the nineteenth century are so liberally strewn with clever comments that to refrain altogether from quoting would be an injustice both to the author and the reader. What could be more to the point than when Dr. Farquharson writes: "Simpson's fame will, of course, rest largely on his discovery of chloroform, but I have always felt that he got more than his due share of credit. For Sir Humphry Davy found out laughing gas, although he did not fully develop its anaesthetic properties. Then Jack-

*In and Out of Parliament. Reminiscences of a Varied Life. By Right Hon. Robert Farquharson, P. C., M. D., LL. D. London: Williams and Norgate. 1911.

son, the American dentist, drew teeth under ether; and chloroform was first made by Soubeiran of Paris, and Simpson was advised to try it by Waldie, a chemist of Liverpool"; or these two anecdotes about French medical celebrities: "Becquerel, whose oft-repeated prescriptions of *venteuses sèches et venteuses scarifiées* used to amuse me; and Bouillou, a great heart specialist, who practised the Sangrado treatment of bleeding *coup sur coup* with or without the copious draughts of hot water. For in these days a disease was considered to be a sort of entity to be wrestled with and violently expelled, and the modern notion that we really cannot cure anything, but merely watch the processes of unnatural Nature, so to speak, and maintain the bodily forces and watch for complications, had not yet been adopted, and a doctor who did not do something drastic in face of an emergency might just as likely as not be censured by the coroner if an inquest became necessary" and "Maisonneuve, a thorough butcher in looks and ways, went one better [than Malgaigne] by his truly diabolic method of removing limbs by *diaclisie* or 'rupture.' He first broke the bone with a loud report by means of a complicated arrangement of blocks and screws, and then cut through the soft parts with a sort of wire loop gradually tightened until the limb dropped off. It is hardly necessary to ask what was the outcome of this barbarous method of so-called surgery, and I suppose that the result of the appearance of the patient in the dead-house would be to label him *mal guéri*."

From the aforementioned anecdotes it might be imagined that Dr. Farquharson's interesting volume deals wholly with his medical career. to the exclusion of that larger life whose fullness means those intellectual diversions without which aridity is its hall-mark. No greater mistake could be made, for not only has he met numbers of interesting personalities in the House of Commons, of which he was member for West Aberdeenshire, but he has lived cheek-by-jowl with such men as Orchardson, the painter, Dr. John Brown, James Payn, Robert Chambers, William Blackwood and others too numerous to mention. Now all these men were not mere specimens of animated clay to be bowed to and talked to for a minute, but entities from which anyone with acumen could derive large benefits. Whether it was his degree of affability or his lack of superior airs, the fact remains that Dr. Farquharson got to close grips with them; and what was their profit is not so much to the point as what was his, for on every page one may detect undeniable signs that here is a physician, thrice fortunate, whose boundaries of daily existence were ever widening on account of an association that falls to the lot of few in the profession.

OPINION AND CRITICISM.

THE BARBER SHOP IN A NEW RÔLE.

The criticisms which have hitherto been visited on barber shops in general have been of the same texture: a broadside of more or less truculent denunciation of the careless methods in vogue and of the gay insouciance of all barbers in the face of diseases which their inattention to the first rules of asepsis is the means of propagating. That our low opinion of the ordinary barber shop, especially as it obtains in this country, has been effective only in lashing us into a fine frenzy of indignation is common knowledge to all; but then it should not be forgotten that medical men, as a general thing, have too high an ideal to fit in with what legislators conceive as the practical side of life. Now though it is a fact that progress, on the lines which would make for the desired improvement in the matter of the proper care of customers when at the mercies of the barber, is not the heartening chapter some would have us believe, on account of what they have observed in the way of an improved cleanliness, all hope should not be abandoned; for though the recent occurrence in which Sir David Bruce, of the Royal Army Medical Corps, slapped the face of a barber's assistant, one Robert Meredith Roberts, for inflicting a cut on his face while concentrating his attention upon another customer, was not incited by a grievance against the insanitary condition of the shop, it has this to its credit that at last the docility of a customer has been proved to be more perishable than adamant; a view which is not entertained by the majority of barbers.

Despite the fact that the foregoing incident occurred in a place as far removed from this country as is Abergele, Wales, the lesson brought home to us is one that should be conned with considerable care; for the hero of the occasion was a medical man who undoubtedly knew the possible consequence of a cut received at the hands of a not too clean barber, and that a reprimand would fall only on inattentive ears. A medical man, generally speaking, is not the sort of hero who deems it absolutely necessary to get satisfaction immediately a wrong is offered him, and whether it be his science or his knowledge of the foibles of humankind that teaches him toleration, the fact remains that under the most adverse circumstances he is often an illuminating chapter in geniality. True, he is not oblivious to abuses; for almost directly he reaches his study the ink flows from his pen in verbiage that is technical enough to delight his brethren, but so masterfully involved that should the article be reprinted in the lay press, no layman would be the better for having

read it. But in the case of Sir David Bruce the reprimand in the shape of a good, honest slap can be understood of all men.

While belligerency on the part of the medical profession should not be too greatly countenanced—what have not been the blows exchanged between some of its most honored members!—its general adoption, in cases similar to the Abergele occurrence, might be more effectual in bringing about the reforms which the medical press in this and other countries has been clamoring for during the last decade or two than all its printed words; for, while the latter make the circumlocutory reading that befogs the ordinary intelligence, the former is so devoid of extraneous matter that he must be a stupid barber, indeed, who will not know exactly the sentiments of his outraged customer. And in this age which is so proud of its “short roads to knowledge,” why should the barber be excluded from benefits which would give him the readiest comprehension of what is expected, in the way of asepsis, by a customer; a bit of knowledge that even the popular article on tinea sycosis and other “tonsorial” diseases cannot possibly convey to him.

THE CONTROL OF TYPHOID FEVER.

Now that the season in which typhoid fever runs rampant is on hand, it were perhaps well to emphasize some points brought out by recent work on its control. It is generally admitted that this is a preventable disease and that its presence in a community is evidence of carelessness, ignorance, or a practical inability to control a situation. Every case of typhoid arises from another, and it is a trite statement to say that the ultimate source of all epidemics must be the improper handling of the individual case. Therefore, while a broad duty of protecting the water-supply from contamination rests upon the state, there is a well-defined duty which each physician should perform if the typhoid situation is to be controlled. This duty can be easily and conveniently divided into the task of recognition of the disease and of protection of others from any source of contamination by the patient.

The recognition of typhoid is by no means always an easy task, especially in the early stages when the excreta are as dangerous as in the late florid stage of the disease. The clinical picture is far from being well defined and an attack of influenza may simulate typhoid. The clinical picture is, however, strongly suspicious, and in view of the extreme importance of an early diagnosis, during the typhoid months every suspicious case should be considered a menace to the public health. Unfortunately also the laboratory aids in the diagnosis are likely to be found only in the later stages. Blood-culture, which will make the diagnosis in a large proportion of cases during the first week, is not a convenient or very practicable procedure for general use, although it would seem that no better service

could be rendered by Boards of Health than by the performance of blood-cultures for the practitioner as freely and as liberally as they now make throat-cultures. The demonstration of the typhoid bacillus in the feces is a task beyond the scope of any but the best specially equipped laboratories. The practical obstacles in the way of a general employment of these two means of diagnosis have left us the Widal test as the only specific diagnostic weapon in our equipment, and the limitations of usefulness of this test are manifold. In the first place, it rarely is present before about the tenth day, and in many cases it may not be positive, even though the clinical course of the disease leaves no doubt that the case is one of enteric fever. The Widal reaction nevertheless occupies the most important position to-day in the control of the situation; for not only is it positive in most cases at some stage, but it is also present in those mild cases of the disease which do not resemble real typhoid, and which, but for a positive agglutination test, would be cast aside as unworthy of the attention of public health officials. These mild cases are just as dangerous as are the severe ones, and require just as much attention to prevent the spread of the disease.

The practitioner's duty in the prevention of the spread of typhoid is a simple one, and consists in the care of the excreta of all cases, definite and suspicious, and of safeguarding those associated with the patient from direct contagion. It is not our purpose to detail means of disinfecting excreta, screening patients from flies, or prevention of pollution of the water supply. These things are common knowledge. We wish to emphasize the extreme importance of consistent employment of this knowledge in the battle to conquer a plague whose presence is a slur on medical ability.

THE CULTIVATION OF SPIROCHÆTA PALLIDA.

During the last decade probably more advances have been made in our knowledge of the etiology, pathology and treatment of syphilis than in any other field of medical research. Schaudinn and Hoffmann's discovery of the presence in syphilitic lesions of a pale thin spirochæta was soon followed by improvement in the technique of finding them, so that it became an easy matter to make an early diagnosis of syphilis. The constant presence of this spirochæta in syphilis, its absence in other than syphilitic lesions, and its presence in the lesions of syphilis transmitted to apes and rabbits by inoculation of syphilitic material from the human, made it fairly probable that it was the actual cause of the disease. Yet all the postulates of Koch had not been fulfilled, and necessarily scientific opinion reserved its verdict until full proof was given. Attempts to grow the organism in pure culture and to reproduce the disease with such a culture had not been successful until very recently, when Noguchi

reported from the Rockefeller Institute a comparatively simple means of cultivation.

By means of stab-cultures in serum-water medium containing a piece of rabbit tissue and grown under strict anaërobic conditions, Noguchi was able by repeated transfers to grow the spirochæta in pure culture. This culture when injected in the testes of rabbits produced the typical lesion of syphilis, from which the spirochæta could again be grown. Thus all of Koch's requisites are now filled, and the medical world must accept the spirochæta pallida as the undoubted cause of syphilis.

It would be well to note here that on account of the development of our knowledge of syphilis, there can be no further doubt how dependent are scientific advancements on the mastery of technical difficulties. The spirochæta has always been the cause of syphilis, yet it was only good technique which permitted its discovery. The Wassermann reaction is a masterly adaptation of scientific principles to practical purposes, and its execution requires the most skillful technical knowledge. Salvarsan was the result of years of application in the chemical laboratory in pursuit of an ideal; and again, Noguchi's latest addition is another indication that only by mastery of technical difficulties can science ever expect to make epochal advances.

LITERARY NOTES.

A book, which surely should be in the hands of all physicians who "waste" a few hours each day reading something besides medicine, is "The Corner of Harley Street" by one "Peter Harding, M. D." (Houghton Mifflin Company, Boston and New York). In the thirty letters contained in the book are enough literary grace and kindly philosophy, enough of that knowledge of things which is not pedantry but something much better, to assuage the outraged feelings of all those medical readers who have suffered, for many a day, from the onslaught of the solvers of problems; those beings of little wit but much conceit who are continually dinning their theories into our ears in the hope of making converts. What has not been written on the subject of sexual instruction, yet how few of the chapters can compare to Peter Harding's letter to the Rev. Bruce Harding, S. Peter's College! In this communication he sets forth his ideas with precision and clarity, but though his ideas are better than most which we see in connection with this vital matter, it is not their soundness that makes the strongest appeal, but the manner of their presentation, for here are gentleness and culture, and that broad outlook of life which precludes the blatant jeremiads of the majority of writers. Whether Peter Harding is writing to his aunt as to whether a ring worn on the third finger, as suggested by her, is really the best treatment for rheumatism, or giving advice to his son on the important subject of

a medical career, or characterizing Mrs. Humphry Ward's reputation as a novelist as "the twentieth-century triumph of the college-bred lady inspector," he illustrates the geniality which only can come when a spacious mind is not so enraptured with men and books but that there is room for a gentle consideration of the foibles of the former and the defects of the latter.

Aside from the personal note, which is one of deep religious feeling, the little book which Dr. Robert N. Willson has written on the subject of "Medical Men in the Time of Christ" (The Sunday School Times Company, Philadelphia) is not without value, if value is to be judged by compactness, brevity of statement, and only occasional comment that is above the ordinary. In short, here is a book that will tell the busy practitioner—busy because he does not as yet know how to live on twenty-four hours a day, according to Arnold Bennett's prescription, and hence cannot devote much time to the reading of elaborate works—a number of interesting things about medicine in the past, and especially about some of the problems which he thinks ultra-modern, because of a lack of knowledge of what was attempted and partly accomplished in remote ages. By the side of such a monumental work as Neuburger's "History of Medicine," Dr. Willson's little book is of mean performance; but how many of us have read Neuburger's elaborate work, though when put to the test we may claim some knowledge of its title?

According to *Paris Médical* of June 10th, the Adam and Eve mansion at Mans, which was latterly in danger—so rumor runs—of being bought by an irrepressible American millionaire and then taken piecemeal to the United States where it was to be reconstructed, has happily been saved to the town by the intercession of its municipality. This celebrated mansion was built between 1520 and 1525 for Jehan de l'Espine, astrologer and doctor of medicine, and got its name from one of its bas-reliefs which represents Eve offering the apple to Adam. In 1556 the house was sold to Denys Gouffon; later it passed into the possession of Pierre Gougeon, councilor of the king and seneschal of Mans. In 1603 François Duchesne, doctor of medicine, was its owner; and in 1604 the records show it was bought by Antoine Lemoine, a bailiff. It was owned by François Lemarchand, a baker, in 1734, and then by Thomas Davoine, a carpenter, whom we take it was the owner upon whom the ubiquitous millionaire attempted to exercise the fascinations of the American dollar. Despite the vicissitudes through which it has passed, the Adam and Eve mansion is still highly prized by the burghers of Mans, and well it might be, for its architectural features are unique and its history not without interest.

ORIGINAL ARTICLES.

THE TREATMENT OF BACILLARY DYSENTERY.

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Dysentery is a term used to designate a morbid condition, characterized by inflammation of the colon and, occasionally, of the lower end of the small intestine as well; hence, it is a colitis or enterocolitis.

It is an acute infectious process which, on etiological grounds, can be divided into two diseases: (1) Amebic dysentery, due to the invasion of the mucous membrane and neighboring tissues by a protozoön, the ameba coli, and (2) bacillary dysentery, due to the pathogenic action on the same structures of a bacillus, or of members of a group of bacilli, spoken of as the *Bacillus dysenteriae*.

The pathological changes of either type have certain distinguishing marks of their own; the symptoms vary somewhat and the sequelæ are not identical; and yet the two are so nearly alike that without the finer aids to diagnosis, the use of the microscope and culture, they may readily be confused.

The bacillary form is the one peculiar to this climate and to the United States, though amebic dysentery is every year more frequently met with even in this city and among those who have not been in the tropics; first, because the stools of dysentery are constantly more carefully examined and, secondly, because, since the acquisition of tropical possessions, more patients are invalided home to disseminate the disease.

This article deals with the more common or bacillary form.

The short incubation of two or three days, the rather sudden onset, with fever, diarrhea, colicky pain and tenesmus, the appearance shortly of mucus in the stools, streaked with blood, later looking like chopped or shredded beef that has been washed out in water, are merely mentioned here to recall what the condition and symptoms are which we have to consider in the treatment.

Therapy.—There are few self-limited infectious diseases that are accompanied by such continuous, nagging discomfort and distress as dysentery. Our ingenuity is exercised to the utmost, not merely in the efforts to shorten the process, but even in attempts to afford some comfort. For success much depends on ability to secure rest.

Rest.—One might assume that the train of events in dysentery would compel rest, and so, indeed, in severe cases it does, but in the cases that in their incipency promise to run a mild course it is often difficult to get the patient to bed; and his failure to accede to such advice may determine a very severe process in what might otherwise have been relatively benign.

Rest in every case is desired both for the body at large, suffering from the effects of the toxins of disease and of pyrexia, to shelter metabolism by avoiding unnecessary work and so diminishing the demand for food to meet such metabolic needs and sparing the organs concerned in digestion, assimilation and utilization of these foods, but also for the particular organs or tissues that chance to be the sites of lesions caused by the disease; in this case, the large intestine. Now, the large intestine is a receptacle for certain materials, in part passed on from above, in part excreted from its walls. In this material fermentative and putrefactive processes are going on as the result of bacterial action. From this material, water and certain substances in solution are being absorbed. This structure, the bowel, is in a condition of active muscular exercise, the site of peristalsis, of a swinging pendulum movement, and finally is pressed upon and massaged by contiguous structures as the result of the action of the muscles surrounding the abdominal cavity, from which arises so great benefit from walking and gymnastics directed to the abdominal muscles in constipation. It will be our effort to diminish the activities of the large intestine, that is, to secure rest. By putting the patient to bed we avoid the squeezing and massaging due to muscular action and so take away one stimulus to increased peristalsis; an important factor, considering the hyperactivity of this function, upon which the frequency of the movements and the colicky pain so largely depends.

Even the bed is a bed of unrest, for the griping pain is always forcing the patient to seek some position to relieve it.

Bed.—Far more work is to be done about this bed by nurse or attendant than about the bed even of a typhoid fever case. The constant use of the bed-pan, the soiling that necessitates changing of the bed-linen, the soothing applications to be made, the irrigations to be given, all demand as much economy of effort as can be procured by favoring conditions to work under. The bed, then, should be chosen with care. It must be a narrow or half bed, best of the hospital type, which is about 6 feet 6 inches long, 36 inches wide and 24 to 26 inches high. The spring of woven wire must be stiff and the mattress of hair preferably firm. Over this is placed the sheet, long enough to tuck well under and draw smooth and taut. If the surface of the mattress is not smooth a folded blanket under the sheet will make it so.

Over the sheet is put a rubber-sheeting that should extend from the pillow to the bend of the patient's knees and wide enough to tuck under. Over this comes the important draw-sheet, a long sheet folded length-

wise and laid across the bed covering the rubber-sheeting and tucked far under one side. This sheet can be drawn toward the other side, little by little, to afford a cool fresh surface under the patient from time to time, or, if soiled, can be replaced without remaking the whole bed. Over the patient is placed the upper sheet and one or two blankets arranged with a view to comfort.

It is very well to have a second bed of the same kind, to which a patient can be drawn while the mattress and clothes of the first are airing.

Room.—Every sick-room, should be large, well ventilated, and should get sunshine. As, however, the disease is far more common in the summer than at any other time of the year, it is well to select a room in which there shall be shade the most of the day. Morning sun and afternoon shade are, of course, ideal. If there is a balcony on which the patient can be wheeled it will, if it is properly screened, serve as the best room possible in the warm season.

A bath-room contiguous to the sick-room is extremely desirable, saving much labor of fetching and carrying, as is obvious.

The odors, which in some cases are very offensive to the patient as well as to attendants, may be mitigated by good ventilation, by one of the many deodorants on the market, whose claim to disinfect the community when a few drops are shaken here and there must not be taken seriously, by the burning of joss-sticks, etc.

Care of the Body.—A cleansing bath should be given each day, if there is a skilled hand to administer it or the manipulation does not cause too much exhaustion.

It is given between blankets, the patient divested of his night-shirt being rolled on one and covered by another. Soap and warm water at 110° F. is used, one part of the body after the other being exposed and attended to and then dried.

The feet may be placed in a small foot-tub in the bed, the knees being drawn up. After the bath the skin may be rubbed with alcohol and dusted with drying powder—one of the numerous talcum or toilet powders in use.

An approximation to this detail can be attained by an attendant in the family, if care is exercised.

The mouth should be attended to by rinsing after every feeding and, if in bad shape, carefully cleansed by gauze or absorbent cotton around the finger of the nurse or on some applicator after dipping into some cleansing solution, like a Dobell's solution or $\frac{1}{2}$ strength Listerine. If very bad, peroxide diluted one-half with water or salt solution may be used before the mouth-wash.

When the mouth is very dry, equal parts of albolene and 2 per cent. boric acid solution with a little lemon juice gives relief. Glycerine is sometimes used, but if the mouth is very dry, it may be aggravated by the glycerine which takes up water so readily.

Constancy of attention and patience are needed to nurse these cases properly, because the restless patient is disarranging the clothes and seeking a comfortable position every moment. The knees are often drawn up to lessen the tension of the abdominal muscles, a hard position to maintain as the feet slip on the smooth sheet. A folded blanket or pillow under the knees gives comfort.

Rings and air-cushions may be needed to take the pressure off the bony parts daily becoming more accentuated.

Nothing is more striking and real than the intangible something we call the "atmosphere" of the room, and it is the ability of the trained hand to secure order, neatness, quiet and calm that gives courage both to the patient and doctor.

Frequent visitors, garrulous friends, Job's comforters, pedlars of similar experiences, *id genus omne*, are to be excluded as a part of the treatment.

The bed-pan in this disease is the most important article in our armamentarium, and its skilful use is imperative. The distressing condition that obtains in some of these cases is hard to appreciate unless witnessed. I have seen stools coming every fifteen minutes with tenesmus that deprived the patient of all sense of relief after the stool, and keeping up for hours, until the patient begged that the pan be not removed at all.

The pan should be warmed before using, the patient's knees flexed and a hand placed under the lower part of the back to raise him. The same thing is done on taking the pan away. Either a clean pan can then be slipped under the patient or a towel may be placed under the pan to begin with, upon one or the other of which the patient lies while the parts are carefully cleansed, dried, rubbed with alcohol and dusted.

It is very essential in this disease that the patient's body and abdomen should be kept warm, as chilling aggravates the diarrhea. Woolen material should be worn over the abdomen. If the feet are cold the hot water-bottle is to be used.

Diet.—During the first few days of the attack, when the stomach is often very sensitive to food, and nausea and vomiting are a feature, and while the evidences of intoxication are most marked and peristalsis most active, the quantity of food is of less importance than the quality.

The food must be bland, non-irritating and non-stimulating to the gastro-intestinal tract, must be readily assimilable and leave but little residue, and must be concentrated, especially with reference to its proteid content. All these conditions are met by milk better than by any other food.

It has been my lot to have a great many cases of dysentery to treat. Most of them, to be sure, were of the moderate type, but not all.

It has been my routine to put the patient on a milk diet, ordering the milk boiled and given every two hours, the patient is to take what he will of 8 ounces.

Why boiled milk should be any better, if as good, as clean raw milk in this condition, I cannot offer adequate explanation. I can only plead handing a leaf out of the book of my own experience. If the patient prefers it raw, or boiled milk distresses him, I do not persist in my prejudices. At the beginning of the attack, especially if there is much fever, I dilute it $\frac{1}{4}$ or $\frac{1}{3}$ with plain boiled water, or barley water or rice water. Preferably plain water. If there is a coated tongue or flatulence or the milk does not seem well borne, I suspect that the fat is not well borne and have the milk skimmed.

I believe the experience of our pediatric practice with reference to intolerance for fats can afford us practical information in its usage in adults.

When the temperature disappears and the stools have lost their diarrheal character, one may allow barley jelly, and thoroughly boiled rice; later, toast, then an egg, then a chop and then gradually the resumption of a normal diet.

When, however, a case runs a chronic course, the same needs for sufficient foods to make good the body losses prevail as in typhoid fever. These will be taken up shortly.

All food should be given warm, for if cold or very hot, peristalsis is aggravated.

Water should be given freely, as it must be appreciated that there is a constant and great loss of water to the tissues. It should not be given too cold or in too large amounts at once, for reasons just expressed.

If, however, milk cannot be taken, one may use barley-water, rice-water, egg-albumin, thin chicken broth.

Milk sugar may be added to the foods given so as to increase the caloric value.

If there is much gastric disturbance, all foods must be stopped, until it is removed.

Care of the Bowels.—As the treatment of the disease resolves itself pretty much into the treatment of the bowel, the preliminary catharsis only will be touched upon here and the rest taken up under symptomatic treatment.

The object of the preliminary catharsis is to clean out the intestinal canal as far as possible before beginning treatment. That the patient has diarrhea and frequent diarrhea is by no means proof that the intestine is clear. It is undoubtedly Nature's intent that it should be, and the diarrhea is but an expression of the intestine's effort to rid itself of irritation, which effort may be futile or abortive, without help.

There are three cathartics especially recommended for this purpose. Calomel, salines, and castor oil.

Personally, I am emphatically in favor of castor oil. I prefer it because I believe it as effectual as the others in evacuating the bowel; because I believe it less irritating than the others and because I am convinced that it has an after-constipating effect.

A recent paper read at the American Pediatric Association by Abt of Chicago dealt with the study of the effects of repeated doses of these three cathartics in infants in doses usually used in diarrhea, with reference to irritating effects produced, as expressed by the presence of mucus and occult blood. After the second dose—the doses given at two hour-intervals—calomel was followed by increasing amounts both of blood and mucus, salines by less and castor oil by least and but little unless in large and long continued doses.

I would not convey the impression that this occurs in the adult enough to decry their use, for I think that would be unfair.

If there is nausea and vomiting accompanying the attack, one gives calomel in divided doses, gr. $\frac{1}{4}$ or gr. $\frac{1}{10}$ every ten or fifteen minutes until one or $1\frac{1}{4}$ gr. are given, for the anti-emetic effect of the drug as well as its cathartic; then, if the stomach is quiet, give the oil, or failing that, salts.

Now, castor oil never was looked upon as a delicacy and the very sight or mention of it is so keenly associated in the minds of many with the ordeals of childhood that it is flatly refused or taken under bitter protest. Because of this fact, so-called tasteless preparations are offered or its taste is covered or it is given in capsules.

There are several ways of giving castor oil while at the same time disguising its taste, and this may be so successfully done at times, as to make it desirable to administer it without announcing its character. Many vehicles, however, like hot black coffee, sarsaparilla, soda or beer are unsuited to the conditions at hand, while to give it in milk is to violate a rule that cannot be too emphatically insisted upon—"never give disagreeable medicines in a food."

The disguise is not complete and the association may turn the patient against an important food.

An excellent method is to put a teaspoonful of brandy, whisky, wine, lemon, orange-juice or peppermint water in a wine or egg glass, let it run all around the surface to wet it, pour on to that 5 teaspoonfuls of castor oil from a spoon previously wetted in hot water to let it run easily, over the oil another teaspoonful of the same substance, and instruct the patient to take it quickly, wiping the lips and allowing him to suck an orange or lemon.

The dose is, then, $\frac{1}{2}$ to 1 ounce.

Specific Treatment.—A specific serum was elaborated by Shiga, which in his hands gave very flattering results that have failed of confirmation. Flexner also prepared a serum which was used in a considerable series of cases of infantile dysentery, but with results that gave little encouragement.

Empirical Treatment.—One drug in dysentery has given me more satisfaction than any other, one drug outside the so-called specifics, and that is castor oil.

The following prescription advised by Dr. Francis Delafield of this city has been especially satisfactory:—

R Olei ricini. 10.
 Salol. 2.50
 Tr. opii deodorati. 1.
 M. et Div. in capsulæ no. xv.
 S. One every two hours.

The results are truly most gratifying and I have had to have recourse to no other prescription in a large series of cases of dysentery, but, that does not include the severest types described, or the tropical variety (amebic).

One capsule is given every two hours and when the stools begin to diminish materially, one every three hours and with still further improvement every four hours.

I believe the improvement is due to the small doses of oil, for the results are very satisfactory without the opium; and one may give the prescription without the opium in the milder cases and when the stools begin materially to decrease in number. The small dose of opium, equal to 1/10 gr., does, however, add its own effect and relieves the pain.

I am not convinced of any particular value on the part of salol. Perhaps it adds its own anodyne and antipyretic effect; any antiseptic virtue, I doubt.

There is one very important adjuvant to this treatment, also insisted upon by its advocate—namely, the administration every second day or at least every third day, of further large doses of castor oil as in the beginning.

The small doses are unquestionably constipating and the diminution of the stools is the result we see, as well as improvement in their character. We have to remember also that in the meantime fecal matter is collecting, mucus, bacterial toxines and bacteria themselves are gathering, and damage from these sources with a recrudescence of the disturbance will follow unless evacuation is attained at suitable periods.

Somewhat similar to this castor oil treatment is one warmly advocated in some quarters, but about which I can speak less authoritatively—namely, the saline treatment.

Sodium sulphate or magnesium sulphate is given in a half ounce or ounce dose, then followed by one dram doses of the salt every two hours, three hours or four hours as improvement occurs, or dram doses every hour can be given until the initial catharsis is accomplished.

Finally, through many generations by many competent observers, ipecac has been used in the dysentery of the tropics and has been considered almost a specific.

It is very rarely used here, for we have little need for it and when tried the results have not been particularly good. Whether this is due to

faulty technique or half-hearted efforts at such heroic measures, one cannot say.

The doses are colossal, gr. xx. and gr. xxx., to be repeated in four to six hours, and necessitate considerable doses of opium at the same time to prevent the emesis that otherwise would surely follow.

Symptomatic Treatment.—Pain. Between the constantly recurring griping, twisting, colicky pains and the incessant nagging of the tenesmus, exhaustion threatens; so that the symptom is one of the most urgent in its demands for relief.

This may be afforded by topical applications or drug administration.

Heat to the abdomen is one of the best measures we have at our command. It can be applied in the shape of hot fomentations, turpentine stupes or thin poultices.

To give a fomentation take two pieces of thick flannel; an old blanket affords just the material we want, cut into squares to cover the abdomen.

Have ready in addition another piece of flannel for a cover or protector and a towel with sticks sewed across either end to answer as a wringer.

Lay the flannel squares in the towel, pour boiling water over them, saturating them thoroughly and then quickly wring out in the towel by twisting the sticks in opposite directions to each other. The wringing must be complete and no water be left in the flannel. Take this out quickly, shake it once in the air, place it on the abdomen and cover with the protector. Before the fomentations are applied, the skin may well be lubricated with vaseline.

It is helpful to have the patient in a blanket which can be brought up over the fomentations.

These may be applied every ten or fifteen minutes until relief is afforded.

Turpentine stupes are prepared in much the same way, a dram of turpentine having been added to the hot water into which the flannels are to be dipped or the stupes may be sprinkled with a little turpentine after they have been wrung out or a bit of absorbent cotton wet with turpentine may be passed lightly over the abdomen before the stupes are applied. Careless application of the turpentine may result in a burning of the skin.

The frequency of application and the length of time they are to be left on will depend on the reaction of the skin to the turpentine and the efficacy of the measure.

These devices not only lessen the spasm, but by so doing diminish the frequency of the stools.

Comfort may also be afforded by warm rectal irrigations, at 100° F. to 105° F. of plain water or, better, physiological salt solution, one teaspoonful (1 dram) of salt to the pint.

These irrigations are considered by some men as an important item in the treatment of the inflamed colon and are especially in vogue in children's practice. I have had to have recourse to them in adult practice,

in the acute stage but rarely finding the prescription given above together with fomentations sufficient.

While at times the irrigation does good, I prefer to do without it if possible, because it can be overdone and one feels that often when it is done, the bowel gets more excitation than rest by the procedure.

The tenesmus frequently requires drug treatment and we prefer to give it locally at first. This can be done by the suppository containing gr. ss of opium or in more severe cases by the morphine suppository which contains gr. ss or by one combining opium and belladonna, e. g.:

R Opii pulveris.gr. i.
 Ext. belladonnae fol.gr. $\frac{1}{4}$
 Olei theobromatis.q. s. (gr. xxx.)
 M. et Fiant talia suppositoria no. xii.
 S. One inserted as directed.

Another time-honored method of using opium by the rectum is through the medium of starch mucilage.

Give m. xv. in an ounce or two of the starch preparation, injecting slowly. In an irritable bowel the smaller amount is more easily retained.

There are cases in which the pain is too great to be relieved by these efforts, and morphine has to be used hypodermically. When this is done, appreciate that a fight is on and the drug habit is the antagonist. Use it sparingly, both as to dose and periodicity, and take the evidences of pain rather than the assertion of the patient as the criterion of its usage.

Diarrhea.—The stools of dysentery are characteristic. They are small, often not a teaspoonful at a time, and consist of little clots of mucus for the most part blood-stained, like soaked meat. It is evident that these stools no longer represent a conservative process, but are the simple expression of the inflammatory process. They test the limit of the patient's endurance. They have to be controlled or rather the bowel must get the rest that a diminution of the stools bespeaks.

Numerous drugs have been advised. They may be divided into three classes: Astringents, local sedatives, and opium.

I do not like the first. Astringents operate by inducing changes in the protoplasmic substance of the cells, that threaten their integrity. One feels that it is heaping Ossa upon Pelion in the acute process.

I pin my faith on the last two, and especially opium.

As to bismuth, its action is largely protective, though, perhaps, to some slight degree partaking of the astringent properties of all the heavy metals. If it is the purpose to coat over the mucous membrane with bismuth, or even if this theory of its action is not correct, still experience has shown that to do real good it has to be used in large doses. It is insoluble and non-toxic, which statements may stand good as far as they influence its therapeutic use.

It should be given in at least gr. xxx doses every two hours until results are obtained. The easiest way to give it is in powders. A powder

in a little water, a shake which diffuses it in suspension in a second, and take so.

One warning must be offered born of experience.

Be sure that at least every second or third day the bowel is emptied by a dose of castor oil or salts, for these large doses of bismuth collect in the bowel and by sheer weight do harm to the gut. One of my most vivid recollections is seeing a case to which bismuth had been given for weeks without catharsis and with the continuance of the symptoms to a point of dubious prognosis.

A large dose of oil was followed by movements that literally filled the bed-pan with black masses of bismuth that looked like fresh tar-concrete and must have weighed pounds. Recovery started from the time of this relief.

Upon opium we are dependent for our best results.

It diminishes peristalsis and so the cause of pain and tenesmus, it diminishes the stools, it lessens pain and permits rest and sleep; rest for the bowel, rest for the body and rest for the mind.

There are three things that should be emphasized about the use of opium in these cases:—

1. Never use it until the bowel has been efficiently emptied by one of the cathartics advised.

2. Use it in the smallest amounts that will get results. I have rarely had to use it in greater amounts than 1/10 of a grain, that is one drop of the tincture every two hours.

3. Do not advise the patient of the fact that you are using it. The profound effects of opium that will permit him to appreciate that he is getting it will not be manifested in these doses.

Again the necessity of the cathartic at intervals of two or three days should be emphasized.

Duration.—Most cases run a course of a few days to a week or a trifle more, a certain number continue three, four, five or six weeks and then cease or pass over into chronic form.

When a case is passing over into a chronic form, if seen for the first time, the effects of such medication as has been advised may be tried long enough to test its worth; if of no avail, make use of topical measures and give as little medicine as possible, especially avoiding opium on account of the danger of the habit.

In the chronic form the use of the irrigation is more valuable than in the acute.

There is one thing about the irrigation and the use of all topical measures to be insisted upon and that is, if used in the acute stage assiduously the chronicity of the process may be due to the irritation these very measures keep up, and a cessation of all local treatment be followed by rapid improvement. Again, when these methods are pursued in a chronic case, improvement may be seen up to a certain point and then cease or the

condition grow worse. Here again stop the treatment and study the effect.

The irrigation is to be done with the patient in the dorsal position with the hips elevated and on a douche-pan, or lying across the bed on a rubber-sheet so arranged as to form a gutter for the discharge of water.

Sometimes the bowel is better filled by putting the patient on his left side and then turning him to his right, so as to seek the assistance of gravity in following the line of the colon.

If the patient is fairly strong, the more trying knee-chest or elbow position may be used.

The tube should be long and soft, a rectal tube, a stomach siphon or a large rubber catheter will answer.

The tube is warmed, lubricated and passed carefully into the bowel, as any roughness will cause a contraction and defeat the purpose. If it meets with an obstruction, wait until a spasm ceases and then try again. If difficulty is met with let a little water pass in to distend the gut and try again. Pass it in eighteen inches or more.

The tube is then or has previously been attached to a Y tube, to the other two limbs of which are attached the fountain syringe and the drainage tube. The bag contains for a simple irrigation plain water or better a physiological salt solution, a level teaspoonful of salt to the pint, at a temperature of 100° F. It should be held about three feet above the level of the patient's body. The water is allowed to flow in and out, by alternately pinching the outflow tube and the inflow tube. Discomfort on the part of the patient tells when enough has been introduced at any one time.

If irrigation of the lower part of the intestine alone is aimed at, a two-way tube like the Kemp tube is a great convenience.

About two quarts may be used at a time; in some cases, even more.

The irrigation may be followed by an astringent.

The best astringent is silver nitrate. It should be used in increasing strengths, 1 to 2,000 at first and increasing up to 1 in 500 or 1 in 400 or 300.

Use one or two pints. It may be introduced through the same syringe and tube. The tube should be pinched to keep the solution in contact with the bowel a few minutes or left in for the patient to pass.

If salt solution is used at first, it must all be discharged or the silver will be neutralized by it.

In this case, if such difficulty is constantly met with, use plain water. If the solution of silver gives great pain it is too strong and may be neutralized by salt solution.

The treatment may be tried daily in the weaker solutions and then less frequently. Intermit the treatment occasionally to let the mucous membrane recover from any irritation by the silver that might have been excessive.

These protracted cases are often due to ulcers which will not heal under this milder application; hence, an effort should be made by the aid of the proctoscope or sigmoidoscope to detect and treat directly any ulcer within reach. Here strong silver in 25 per cent. solution or the stick may be used.

There are two other important matters to be taken into consideration in the treatment of chronic dysentery—namely, change in environment and the diet.

What those subtle influences are that determine improvement in a new environment, seen in those patients fighting to overcome a lingering infection of one kind or another, defies analysis at present.

While climate, fresh air, sunlight and other physical conditions may be appealed to, they are not always sufficient. The effect upon the mind induced by a change certainly has something to do with the results. I recall a bitter struggle with dysentery, occurring in a patient attacked away from home, dragging out to eight or ten weeks in whom the home-going, though effected on a stretcher, brought health and strength in a manner little short of the miraculous, and such examples every practitioner of medicine can recall.

Diet in the prolonged or chronic cases is an important problem.

During the progress of this disease the patient loses much flesh, to which the low diet adopted to spare the inflamed bowel, has been a factor.

Loss of body substance in infectious diseases is due to (1) pyrexia, (2) toxemia, and (3) starvation. Now, in these prolonged cases the fever has waned and the signs of general toxemia, other than the residual weakness, have subsided, and because the patient has still too many loose stools with mucus, he is kept on the same restricted diet.

The diet is milk, perhaps two quarts of it with about 1,280 calories and 70 grms. of proteid. Now how can a man, whose daily needs are well over 2,000 calories, make up 1,000 deficit out of his own tissues day after day and still afford energy enough for successful resistance and repair? The proposition is absurd, and I am convinced that in a large percentage of these cases that drag along, starvation is at the bottom of it.

I look through dietary after dietary and see milk, cautiously a little egg and still more cautiously a little scraped meat offered, and no mention made of the use to which the carbohydrates could be put. I do not think we should be alarmed at the addition of a little sugar to the milk, and, if we fear fermentation, we can add milk-sugar which is not easily fermentable. Every ounce is worth 120 calories and we could add three ounces to the two quarts of milk without provoking trouble or even distaste.

I cannot see why the cereals should not be used—barley, rice, farina, bread and butter, cereal soups; eggs may be given, each worth 60 to 70 calories. A small chop is easily digested and modern physiology emphasizes how easily proteid is digested and assimilated and there are 100 calories more.

Beef, mutton, chicken, and potatoes leave but little residue, and if the patient does well on this more liberal diet, give him some of the green vegetables, puréed at first—peas, or small stringed beans—and let us see if they do not improve rather than aggravate the condition.

What should be emphasized is that the body may suffer more from the absence of food than the intestine from its presence. That when the acuteness of the process has subsided, one should consider the dietary needs of the patient, and see that he gets it, at first in food that leaves but little residue, and then permitting other foods little by little. We are humiliated sometimes to find that these chronic cases improve when first they escape our hands.

Prophylaxis.—The bacillus seems to be water-borne, and so when an epidemic occurs the same precautions should be taken as in that other water-borne infection—typhoid fever. Water should be boiled, milk inspected or boiled, green vegetables thoroughly cleaned. Infection, too, may come from contact, and the stools should be destroyed and clothes treated in the same manner as in typhoid.

HEMOCHROMATOSIS WITH DIABETES.

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Hemochromatosis with diabetes or "Bronze Diabetes" has been known to pathologists and clinicians almost thirty years, yet less than 40 cases have found their way into the literature.

The following case offered exceptional opportunities for study:—J. M., German, married, aged forty-six, marble polisher by occupation, came under observation December 29th, 1908, complaining of cramping pains in the leg muscles, slight pain in testicles, headache, thirst and weakness.

Family History.—One sister died of tuberculosis, otherwise no data of importance.

Personal History.—Patient was strong and well as a child, gonorrhea followed by a stricture at eighteen, otherwise well until the beginning of the present illness.

Present Illness.—Two years ago patient began to notice that he was becoming weaker and that his appetite was failing. He consulted a physician under whose care he improved considerably for a time, but never regained his normal strength. He continued his work, however, without much difficulty. About a year ago he began to notice pains in the leg muscles. These pains were cramping in character, would last for an hour or two and then disappear for days or even weeks. About this time his wife noticed that his color was becoming "sallow" but not noticeably darker.

This condition continued, the pains becoming somewhat more frequent and severe until about December 1st, 1908, at which time the patient first noticed that he was developing an unusual thirst with increasing frequency of urination. The weakness became more pronounced and dull headache developed. Friends began to comment on his dark skin about this time. A few days later his ankles began to swell and some pain developed, especially after standing for a time. The leg cramps became more severe, and the patient was obliged to stop work about December 25th, 1908. Four days later he came to the Medical Clinic of St. Louis University.

Habits.—The patient drank from one to two glasses of beer a day for years until a month before coming to the clinic; since then he has used no alcohol of any kind. He used tobacco to excess until two years ago; since then he has smoked one or two cigars a day. He has always eaten and slept regularly. His sexual habits were moderate, but during the past year his sexual power has diminished somewhat.

Physical Examination.—December 29th, 1908, 11 a. m. Temperature 99° F.; pulse 84, regular. Blood-pressure 150 mm. by Stanton's sphygmomanometer. Radial artery somewhat thickened. Weight 140 lb. Height 5½ feet.

The patient is fairly well-nourished and looks about the age stated. His hair, light brown, is thin, very soft and silky. The skin of the head and face is of a peculiar bronze-brown color, dry and somewhat scaly. This bronzing is more marked about the eyes and over the prominent portions of the cheek. The facial expression is dull, almost apathetic. The lips and ears are very slightly cyanotic. There is no evidence of pigmentation on the lips, gums, tongue or buccal mucous membrane. The teeth are poor; tonsils and pharynx normal.

The neck shows a more marked bronze color than the face. The thyroid shows no enlargement. The chest is well formed. The skin is not so dry as on the exposed portions of the body. The pigmentation shades off below the clavicles to a light brown except about the nipples and axilla where it is very dark. The skin of the arms resembles the chest, but the forearms and hands are very dark; the skin is thick, dry and inelastic, so much so in fact that the outer layer can be cracked by pinching it.

The abdomen shows marked pigmentation about the umbilicus. The genitals are almost black, as is also the anal region and the thighs close to the genitals. The remainder of the thighs shows little discoloration. The popliteal spaces are pigmented over an area about the size of the hand. The legs show marked pigmentation over the tibias. The feet are somewhat pigmented, but not so intensely as the hands; neither is the skin so thick nor so inelastic.

The respiratory excursions of the chest are regular and equal, but somewhat diminished in extent. Litten's shadow measures 3 inches on the right and 2 inches on the left, in the midaxillary line. The cardiac impulse is most marked in the fifth intercostal space, 4½ inches from the midsternal line. It is rather quick and slapping in character.

The abdomen is somewhat fuller on the right side below the costal margin, but elsewhere seems rather retracted. The superficial vessels are not enlarged. The genitals appear normal. The ankles slightly edematous.

The palpable cardiac impulse is rather weak and quick. Vocal fremitus somewhat diminished, but equal on the two sides of the chest. The liver can be felt about a finger's breadth below the costal margin; it is smooth and not especially firm. The spleen can be felt at the costal margin; it is smooth and soft.

The absolute heart dullness measures 2½ by 2 inches. Pulmonary resonance is normal. The absolute liver dullness begins at the sixth rib and extends a finger's breadth beyond the costal margin in the mid-clavicular line, and to the left as far as the midsternal line. The splenic dullness extends about a finger's breadth beyond the costal margin. There

is no increase of dullness in the flanks. The abdomen on the whole is tympanitic.

The first sound of the heart is somewhat shorter than normal and the aortic second sound is accentuated. Auscultation of the lungs reveals nothing beyond slight emphysema.

Examination of twenty-four-hour-specimen of urine on December 30th showed quantity 4,000 c.c., specific gravity 1,032, acid reaction, color dark brownish-red. Albumin $\frac{1}{4}$ per cent. by Esbach method, sugar 6 per cent. by Lohnstein method, free hemoglobin in considerable quantities. The sediment contains red blood-cells, hyaline-and granular casts.

Blood examination on the same date showed hemoglobin 70 per cent. by Dare's hemoglobinometer; red blood-cells 3,800,000, leukocytes 6,800. The differential count of the leukocytes showed polymorphonuclears 70 per cent., small lymphocytes 22 per cent., large mononuclears 6 per cent., mast cells and eosinophils of each 1 per cent. There was no evidence of lipemia.

A small piece of skin was removed from the forearm for pathological examination.

Report on skin section removed on December 30th, 1908, by Dr. R. L. Thompson, is as follows:—Section of skin from arm (reaction for ferric salts with ferrocyanide of potassium and acid alcohol after lithium carmine) shows a large amount of yellowish fine granular pigment in the epithelial cells. This is probably, to a considerable extent, the increased normal pigment of the stratum germinativum of the epidermis. Similar pigment is occasionally seen in the cells of the stratum filamentosum. There is also to be seen a coarser granular pigment in the epithelial cells of some of the sweat glands, and occasionally a few granules are found in the connective-tissue. This latter pigment is colored a rather bright bluish-green with the above stain.

On January 3rd, 1909, the patient entered Rebekah Hospital. He was given carbohydrate free diet for three days. During the second twenty-four hours the urine quantity fell to 1,800 c.c., the specific gravity to 1,028, sugar to 2 per cent. During the third twenty-four hours the urine measured 1,200 c.c., specific 1,026, sugar $\frac{1}{2}$ per cent., acetone and diacetic acid in small quantities in both samples. Free hemoglobin was present as on previous examinations.

The patient was placed on Von Noorden's oatmeal diet, and for three weeks the quantity of urine varied from 1,000 to 1,260 c.c.; in twenty-four hours the sugar from $\frac{1}{4}$ to 1 per cent. The albumin, hemoglobin and casts, however, remained constant, and free blood was always present. During this time the patient improved both in strength and spirits, his weight increased to 148 lb. Repeated examination of the stools during this period revealed nothing abnormal.

On January 13th a von Pirquet test was made. The abrasions were examined at the end of twenty-four and forty-eight hours but showed no reaction.

The patient left the hospital January 29th without change in his physical signs but feeling much more comfortable. The diet was continued, adding celery, meat and spinach.

At the end of a week patient came to the dispensary, feeling somewhat weaker. The urine was not materially changed, but on physical examination the abdomen was found to be slightly distended, and there was dullness in the flanks, which shifted on change of position.

The following week the abdominal distension was increased, and the dullness in the flanks, increased to the anterior axillary line, could be readily shifted with change of position. The urine had increased to 2,000 c.c. in twenty-four hours, the specific gravity was 1,030, sugar 2 per cent. The patient gave a history of eating excessively of the oatmeal. He was advised to re-enter the hospital, but decided to wait a week. He was given directions to take carbohydrate free diet for two days, then resume the oatmeal in reduced quantities.

On February 23rd, 1909, patient re-entered hospital. He complained of slight dimness of vision and the eyes were examined by Dr. A. S. Steiner, who reported them normal except for slight presbyopia.

On February 24th Dr. J. W. Marchildon made tests of the hemolytic power of the patient's blood. The results were as follows:—

- (a) Patient's red blood-cells with patient's serum show no hemolysis.
- (b) Patient's red blood-cells with normal serum show no hemolysis.
- (c) Patient's red blood-cells with normal salt solution show no hemolysis.
- (d) Normal red blood-cells with patient's serum show no hemolysis.
- (e) Normal red blood-cells with normal serum show no hemolysis.
- (f) Normal red blood-cells with normal salt solution show no hemolysis.

The quantity of the patient's urine on the same day was 720 c.c., dark reddish-brown in color, specific gravity 1,030, albumin 1/10 per cent., sugar 2 per cent., casts and red blood-cells as in previous examinations. The physical examination on February 24th showed the abdomen to be greatly distended. Dullness extended to the midclavicular lines on both sides. Fluctuation was easily demonstrated. The liver dullness extended only to the costal margin. A few ecchymotic spots about 1 cm. in diameter were noted on the legs. The patient, except for increasing weakness and the discomfort caused by the abdominal distension, said he felt as well as before leaving the hospital.

During the next two weeks the patient was freely eliminated and the abdominal distension diminished slightly. The urine quantity, however, could not be increased beyond 1,100 c.c. in twenty-four hours, and most of the time was below 900 c.c.

On March 13th, it was considered advisable to do a paracentesis. Six litres of dark reddish-brown fluid were withdrawn. This fluid had a specific gravity of 1,012, contained little fibrin, but albumin was abundant. 1/2

c.c. of this fluid caused a well-marked reduction of Fehling's solution. The sediment was stained and differential count of the cells resulted as follows: Small lymphocytes 70 per cent., polymorphonuclears 25 per cent., large lymphocytes 5 per cent. The fluid contained a considerable amount of free hemoglobin and red blood-cells were numerous.

The urine examination twenty-four hours before the paracentesis showed: quantity 400 c.c., specific gravity 1,027, albumin 1/10 per cent., sugar 3 per cent., free hemoglobin, but no acetone or diacetic acid. Casts and red blood-cells were numerous in the sediment. After paracentesis the liver could be felt at the costal margin.

For the next ten days the patient was more comfortable, but became steadily weaker. The urine quantity was not above 800 c.c. in twenty-four hours.

The blood on March 18th contained 3,800,000 red cells and 4,950 leukocytes per cubic millimetre. Hemoglobin was 70 per cent.

On account of the weakened condition of the patient all attempts at diet were discontinued on March 20th. The patient was given milk, eggs and a little bread. Sodium bicarbonate in $\frac{1}{2}$ drachm doses was given every four hours.

On March 25th paracentesis was again performed and five litres withdrawn. This fluid resembled that previously examined except that the reaction for sugar was even more pronounced.

The urine on March 28th measured 780 c.c. in twenty-four hours, albumin 1/20 per cent., sugar 2 per cent., acetone and diacetic acid present in small quantities.

From this time on the patient's condition grew rapidly worse. He complained of no pain, but was too weak to sit up in bed for nourishment. He became stupid, answering questions with difficulty. The abdomen filled rapidly, and on March 31st four litres were withdrawn which resembled in all respects that withdrawn on March 25th. The urine was voided involuntarily after March 31st, but was apparently greatly reduced in quantity.

Respiration became labored, the temperature dropped from normal to 96.5° F., where it remained in spite of stimulation. On April 2nd the patient became comatose, pulse and respiration gradually failed, and he died on April 4th.

AUTOPSY PROTOCOL.

The report on the autopsy and histological findings by Dr. R. L. Thompson is as follows:—

Body of a fairly well-developed, poorly-nourished male. Face and neck dark brown (bronzed) in color, shading off over clavicles to lighter brown. This brown color includes also forearms and hands. The genitals are almost black in color. The lower limbs are not so much involved,

but brown pigmentation quite marked in popliteal spaces and over tibiae. In these latter places are also numerous ecchymoses and several discrete pigmented areas, about $\frac{1}{2}$ cm. in diameter. Some increase in pigment is seen about umbilicus. Abdomen shows three pigmented scars below umbilicus (paracentesis scars).

Abdominal cavity.—Paniculus adiposus fairly thick; infiltrated around central puncture with blood-stained fluid. Peritoneal cavity contains two litres of blood-stained fluid. Intestines dark bluish-red in color and somewhat matted together with fibrinous adhesions, which are easily separable. Lower edge of liver one finger's breadth above costal margin.

Pleural cavity negative. Lungs negative save for congestion and edema.

Pericardium negative. Heart, weight 300 grms. Left ventricle 2 cm. in thickness, firm, dark red in color. Endocardium, myocardium, and valves appear normal. Coronary arteries show slight sclerosis.

Liver.—Weight 1,780 grms. Surface shows typical "hobnailed" appearance and is dark brownish-red in color. Gall-bladder and ducts normal.

Spleen.—Enlarged. Weight 400 grms. Fairly soft in consistence. A few scattered patches of fibrous thickenings appear on surface. Section shows increased size of Malpighian bodies; some pulp adheres to the knife on section; trabeculae prominent but somewhat obscured by pulp.

Pancreas is enlarged. Weight including considerable adherent fat 150 grms. Consistence apparently diminished. It is irregularly invaded by yellow fatty tissue and gray fibrous trabeculae. The organ exhibits a dark brown color where this fat is lacking. On section the organ is deep seal-brown. Pancreatic artery tortuous and sclerotic. Tail of pancreas is firmer than head and shows normal lobulations.

Lymph-nodes.—The retroperitoneal lymph-nodes, especially in the region of the pancreas, are enlarged, firm and chocolate-brown in color.

Kidneys.—Weight, 310 grms.; appear about normal in size. Capsule slightly adherent, but leaves smooth surface on stripping. On section organs show marked congestion with clear differentiation of cortical and medullary portions. Cortex measures 6 mm. Adrenals negative. Bladder negative.

Intestines.—The mucosa of both large and small intestines is slate colored. Stomach negative save for similar slate color of mucous membrane.

Arteries.—The aorta is fairly normal, but shows a few yellow atheromatous patches. There is, however, marked sclerosis of the mesenteric vessels, especially the splenic and pancreatic arteries.

ANATOMICAL DIAGNOSES.

Edema and congestion of lungs. Acute fibrinous peritonitis. Chronic interstitial pancreatitis. Chronic interstitial hepatitis. Chronic inter-

stitial splenitis. Chronic interstitial nephritis. Arteriosclerosis (moderate). Pigmentation (hemochromatosis) of skin, liver, pancreas, spleen, kidney, lymph-nodes, blood-vessels, and intestines.

MICROSCOPIC REPORT.

Sections treated with ferrocyanide of potassium and acid alcohol, after staining with lithium carmine, show the following:—

Heart.—There is a widespread infiltration of moderately-coarse granular pigment within the muscle-cells throughout the organ, only a part of which stains bluish-green. All of the cells are not equally affected; some are completely filled with the pigment and some contain only a few granules. The distribution is to a certain extent in patches, areas of the muscle containing little pigment alternating with areas containing a great deal of pigment. Only a relatively small amount of pigment is found in the interstitial tissue of this organ.

Liver.—The organ shows a marked increase in the interlobular connective-tissue and moderate atrophy of the liver cells (typical chronic interstitial hepatitis). The interstitial tissue is everywhere loaded with pigment masses which react to the ferric stain. In addition the liver cells themselves are practically everywhere more or less completely filled with this pigment. Masses of the pigment are found, moreover, within the capillaries between the cords of liver cells.

Spleen.—The organ shows a marked increase of connective-tissue throughout (chronic interstitial splenitis). The Malpighian bodies are poorly defined, and the vessels of the same show hyaline degeneration of the walls. Throughout the organ small masses of the bluish-green staining pigment are seen. With the high power, fine pigment granules are to be seen in considerable numbers in every field in addition to the larger masses.

Pancreas.—The pancreas also shows a considerable increase in the interstitial connective-tissue (chronic interstitial pancreatitis). The islands of Langerhans are in general fairly-well preserved, but some show increase of fibrous tissues along their capillaries. These cells also contain a considerable amount of pigment. The interstitial tissue in this organ is also everywhere filled with iron containing pigment, as was described in the liver. The epithelial cells generally contain pigment; sometimes only a few granules, but more frequently large masses completely obscuring the cell.

Lymph-nodes.—Sections from mesenteric lymph-nodes show only occasional islets of lymphoid tissue, the greater part of the section being composed of innumerable closely set masses of coarse granular pigment which reacts to the ferric stain.

Kidney.—In the kidney, which shows moderate increase of connective-tissue in the cortex, there is less pigment than is found in other organs.

Occasionally, however, a convoluted tubule is found, the epithelium of which is filled quite completely with coarse granular bluish-green pigment. In the pyramids practically no pigment is seen.

Intestine.—Sections of intestine show a considerable amount of fine yellowish (iron free) pigment scattered diffusely through the muscularis and submucosa. In the mucosa larger masses of coarser pigment are found within the epithelial cells which in part react to the ferric stain.

Muscle.—Section of striped muscle (rectus abdominis) shows no pigment.

Blood-vessels.—The walls of the larger blood-vessels, both veins and arteries, show fine granular yellowish pigment which does not react to the ferric stain. This pigment appears in both the media and adventitia, and is usually in the smooth muscle and connective-tissue cells.

General Considerations.—The etiology of bronze diabetes and hemochromatosis has been the subject of speculation since the report of the first cases by Hanot and Chauffard¹ in 1882. These, and other observers of the French school, considered that diabetes was the primary disease; the result of this diabetes being a destruction of the red blood-cells, with consequent formation of pigment from the iron thus liberated and its subsequent deposition in the skin, liver and pancreas. The presence of this pigment, they thought, gave rise to chronic interstitial inflammation.

Von Recklinghausen,² in 1889, made a study of bronze diabetes, as well as certain other conditions where similar pigment was present without glycosuria. He concluded that the pigment was derived from the blood, and described two distinct varieties, one containing iron, which he termed "hemosiderin," and the other containing no iron, which he termed "hemofuscin." The location of these pigments he described in detail. To all these conditions whether complicated with diabetes or not he gave the name "hemochromatosis." For some years following, the French refused to associate hemochromatosis with bronze diabetes.

Marie³ thinks that following some primary etiological factor the hemoglobin of the blood is transformed by the body cells into pigment. This pigment, he thinks, causes the destruction of the cells in which it is deposited and produces interstitial inflammation. Bronze diabetes he considers a peculiar form of diabetes but associated closely with the pancreatic form. Acard,⁴ Dutournier,⁵ and Jeanselme⁶ support this view and suggest that the interstitial pancreatitis is the cause of the glycosuria. Anschuetz⁷ is also in accord with this idea.

Opie,⁸ in 1899, reviewed all published cases, and reported one of his own. He comes to the conclusion that diabetes is the terminal event in hemochromatosis and appears, he thinks, after the interstitial inflammation has obliterated a large number of the islands of Langerhans. His case he thinks died before such a stage was reached.

In the case here reported the diabetes probably preceded the liver

cirrhosis. This cannot be considered, however, as a fact in favor of the original theory. Many cases show cirrhosis of the liver well marked before diabetes begins. There is no reason to doubt that the interstitial inflammation may first appear either in the liver or pancreas, or, granted that it begins simultaneously in both organs, advanced more rapidly in one or the other due to the individual susceptibility to such change.

The question as to what causes this deposit of pigment has been variously answered. Most authors agree that it must come directly or indirectly from the blood. Some authors report moderate grades of anemia in these cases. Anemia, however, is not constant and often appears late in the disease. Hess, and Zurhelle,⁹ with some of the more recent French observers, believe that some unknown toxic substance causes increased hemolysis; and, in support of this, mention the anemia, hemoglobinuria and purpuric spots which appear in some cases. Futcher¹⁰ agrees with this theory. Meltzer,¹¹ on the contrary, cites the cases where no anemia was present and contends that there is no increased hemolysis. Berg¹² believes that there is some disturbance in the metabolism, which prevents the elimination of the iron from the red cells normally destroyed.

The work of Dr. Marchildon, in testing the hemolytic power of the blood of this case, seems strong evidence against the theory of increased vulnerability of the red cells and makes the contention of Berg more plausible. The belief of Simmonds¹³ and others that alcohol is the chief etiological factor, seems not to be well founded. Fully one-third of the reported cases do not give a history of the excessive use of alcohol, and the large numbers of alcoholics with cirrhosis of the liver, but without pigmentation, also argues against this theory.

Whether the derangement in the metabolism, which most authors agree brings about hemochromatosis, is due to an intoxication cannot be proved or disproved until our knowledge of metabolism has advanced far beyond its present state.

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SOME GENERAL CONSIDERATIONS IN REGARD TO RIGHT
HYPOCHONDRIAC PAIN.

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The diagnostic study of a case from the standpoint of the chief complaint or presenting symptom has the disadvantage that one is depending upon a subjective manifestation, the expression of which is modified by the character of the patient. Exaggeration of symptoms, as well as malingering, may lead to error in judgment. There are well-known methods, however, by which overstatement or attempts at deception may often be interpreted in their proper terms. Suspicion may be aroused by an increased sensibility to minor inflicted pain, or by an increase of knee-jerk not accounted for by the presence of organic disease. Perhaps, in an apparently paralyzed limb a contralateral reflex may be observed. In other words, by a thorough study of the psyche of the patient, by the recognition of the presence of the stigmata of hysteria, or by the carrying out of various methods by which a pseudo-sufferer may be detected in his attempt to deceive, diagnostic pitfalls may be avoided. It is needless to say, that information received from persons other than the patient is often illuminating.

Case I.—N. T., female, *aet.* thirty-two, is markedly psychasthenic. This patient complains that she menstruates almost constantly, and that sometimes weeks will pass without her having a bowel movement. On being placed under observation it was found that her menses were of the twenty-eight-day type, and that she had a daily fecal evacuation. At another time, she complained of severe right hypochondriac pain. Other symptoms and signs were present which made the diagnosis of gall-stones a probable one. There was in addition evidence of the presence of chronic appendicitis. An adherent appendix was removed, and several gall-stones were taken from the gall-bladder; the patient claimed to have received no relief from the right hypochondriac pain. She was told that she was now suffering from a habit pain; but she was unconvinced, and stated that when her bowels moved, stones would fall into the bed-pan like hail. She supported this statement in the face of evident disbelief by bringing a large number of ordinary pebbles for examination. In spite of the fact that her attempted deception has failed, there is still complaint of severe pain in the region under consideration.

Such attention-pain, according to Dana's¹ admirable interpretation, is real pain in spite of the fact that the sensory stimuli have dropped to normal. Owing to a lowered threshold of consciousness, ordinary stimuli now pass within the region of cognition, and, the attention of the patient

being directed to these stimuli, they are registered as pain. The recognition of the type of pain present is of paramount importance from the standpoint of therapeutic relief.

That pain is often salutary, in that it leads a sufferer to seek medical advice and to undergo proper treatment directed to the removal of its cause, is a matter too well recognized to require amplification. The following cases exemplify the difficulty with which patients are handled where this compelling force is not present to a marked degree.

Case II.—M. E. V., female, *aet.* fifty-one, was seen March 31st, 1911, suffering with severe right hypochondriac pain. There was nausea and occasional vomiting. The region over the gall-bladder was tender, and there was pronounced local muscle-spasm. Subsequently there developed typical, mild obstructive jaundice with a slight rise of temperature, and a moderate leukocytosis. There had been no previous attacks of pain, and the patient's history was otherwise negative except in that she had suffered from a long continued train of dyspeptic symptoms. Operation was advised, but was refused for a considerable period on account of the absence of pain. The patient's objections were finally overcome, and an operation was performed. The gall-bladder was surrounded by recent adhesions, and contained many stones, one of which was wedged at the entrance of the cystic duct. The bile gave a pure culture of *B. coli communis*.

Case III.—C. M. F., female, *aet.* fifty-six. Chief complaint: paroxysmal hematuria. First attack two and a half months previous to her admission to the St. Francis Hospital. During the last few months, there had been a slight loss in weight. There had never been any pain except in the bladder at a time when it was full of clots. Examination of the abdomen disclosed a movable and apparently irregular mass which corresponded with an enlarged right kidney. This could be pushed well below the examining hand. The hemoglobin was 85 per cent. The patient's general condition was good, but she was markedly psychasthenic. Catheterization of both ureters was performed by Dr. Huggins, and blood was seen to be issuing from the right ureter. The character of the urine obtained from the two ureters was as follows:—

Right.—Acid; albumin present; red blood-corpuscles many; white blood-corpuscles present; no casts.

Left.—Acid; albumin present; red and white blood-corpuscles a few; no casts.

Previous examination had resulted in the following findings:—

Right kidney excreted 17 c.c. in one hour.

Left kidney excreted 20 c.c. in one hour.

Right-kidney urine contained 0.8 per cent. urea and left-kidney urine 1.6 per cent.

Indigo-blue test.—Right-kidney urine after one hour: colorless. Left-kidney urine after eighteen minutes: color slight—after twenty-one minutes: fair—after twenty-eight minutes: marked.

After consultation with Dr. Huggins and Dr. R. T. Miller, Jr., a diagnosis was made of disease of the right kidney, probably malignant in character (hypernephroma), and immediate exploration was advised. Had the patient been suffering severe pain, it is probable that the advice given would have been followed. The patient, however, refused to recognize

the urgency of her condition, and left the hospital stating that she would probably submit to the operation later, after she had recovered strength.

It is interesting to note that in growths of the kidney, pain appears late, if at all. Thus Israel as quoted by Johnson,² states that pain is usually absent in malignant disease of the kidneys except at such time as clots may be passing through the ureters, or when the growth has reached such size as to produce pressure-symptoms. As women have more lax abdominal walls than men, he states that the former seldom have such pressure-symptoms until an inoperable stage has been reached. To this fact he attributes the high mortality of the disease in women. This insensitiveness of viscera to ordinary stimuli, as insisted upon by Mackenzie³ and others, may explain the absence of pain in many conditions of the heart, stomach, liver, kidneys and pericardium, in which its presence would be of diagnostic aid.

In considering the significance of pain in the right hypochondriac region, one is struck with the comparative frequency with which such pain originates in a distant organ. The theory of Head that centripetal impulses originating in insensitive organs are reflected to the periphery through the segment of the cord at which they are received, and more especially the vascular crisis hypothesis as advocated by Pal, explain many, but not all, of these transferences. The important clinical fact is that many pains which have their maximum in the right hypochondrium may be due to diseased condition in the lungs, in the pleura, and in other more or less remote structures.

A detailed enumeration of the various conditions, which may induce right hypochondriac pain, would be wearisome; a consideration of the various diagnostic problems involved would be manifestly impossible within the limits of a brief paper. It is obvious, however, that in practice we should keep in mind a list of all possible causes of such pain, and it is important that we should be alert to notice all manifestations even of an apparently trifling nature, which might turn a scale of probability from one source of pain to another. In certain of the conditions which may produce right hypochondriac pain, diagnosis without exploration or autopsy may be difficult or impossible. As a rule, however, careful observations, logical reasoning, and perhaps some imagination will solve the problem. An occasional glance at such charts as those of Head or of Schmidt⁴ may be a useful reminder even to the adept, since he will find at times that memory has failed him, and that he may have overlooked a condition fairly crying for recognition.

The full utilization of such aids as the laboratory may afford will often make a diagnosis possible even where the condition is, at first, baffling. Thus, a cell count of the spinal fluid or a positive Wassermann reaction may clear up the diagnosis of a syphilitic liver. In certain other instances, a final diagnosis may be arrived at only by observing the further course of the disease-process.

Case IV.—Mrs. J. H. M., *act.* sixty-three, was operated upon for cancer of the right breast in November, 1907. The diagnosis was confirmed by microscope. Two years subsequently she developed a dragging sensation in the right hypochondrium, which suggested the possibility that a metastasis had taken place. A study of the patient's symptoms in connection with a physical examination showed that in addition to an enlarged liver there was a weak myocardium, with relative mitral insufficiency and venous stasis. The surface of the liver was smooth, and there was absence of evidence of portal and biliary obstruction. There was, apparently, no carcinomatous involvement of other organs. It was decided, therefore, that the condition was probably due in part at least to venous stasis dependent upon cardiac decompensation. This position was subsequently secured by the fact that the size of the organ lessened, and that the right hypochondriac discomfort disappeared when the stronger heart-muscle was able to maintain a better mass movement of blood.

In arriving at the cause of a given symptom, a knowledge of the relative frequency with which individual etiological factors might be present would be of great importance. Cabot⁵ has made a painstaking attempt to compare these in a graphic way, and his diagrams well repay study. This author admits the incompleteness, and relative inaccuracy of these diagrams; yet he has developed a means of study which is of great value and which is worthy of amplification.

It is a well-known fact that gall-stones are found with great frequency upon the operating table, and at autopsy. In 11,333 post-mortem examinations made at Guy's Hospital, Hale White found them in 3 per cent. of adult patients. Mayo⁶ has recently estimated that one-half of one per cent. of individuals of all ages have gall-stones, and that 5 to 8 per cent. of women and 2 to 4 per cent. of men have gall-stones after the age of fifty.

In spite of a knowledge of such statistics, and of a clinical experience which points to the great preponderance of gall-stones as a cause of pain in the upper abdomen, one is struck by the relatively extraordinary length of the line at the head of that diagram in which Cabot endeavors to represent the relative frequency of various causative factors of pain in the right hypochondriac region. Cabot's statistics show that cases of gall-stones and cholecystitis are the origin of such pain in 648 out of a total of 781 instances. The same author finds gall-stones to be causative in 329 instances out of 1,663 cases of pain in the epigastrium. Mayo⁶ says that in his experience the colic of simple gall-stones is usually most intense in the epigastrium. This divergence eloquently testifies as to the admitted fallibility of statistics based upon a patient's description as to the location of pain. The diagram has nevertheless justified itself. It has carried home its lesson that, in the production of pain in the upper left and central abdomen, the gall-bladder and its possible foreign contents are overwhelming factors.

Any conception as to the value of pain as a diagnostic clue would be inaccurate, were one to ignore the fact that pain is frequently absent in

severe conditions in which one would naturally expect severe physical suffering to be a marked and constant feature. This absence of localized pain may be due to a variety of causes. Reference has already been made to the insensibility of certain organs to ordinary painful stimuli. In other instances, marked bodily discomfort—an overshadowing pain elsewhere, for example, or the presence of the subjective symptoms of a circulatory breakdown—may make the local manifestation appear of so trivial a nature that it may be entirely overlooked in the anamnesis. To such a group, belong those causes of passive congestion of the liver in which one finds an enormously distended organ, but an hepatic condition entirely latent in so far as the production of subjective symptoms is concerned.

Case V.—G. H. H., male, *aet.* thirty-two, was admitted to the Pittsburgh Hospital for treatment for a harassing cough and urgent dyspnea. His cough was so troublesome and constant that the patient had been practically without sleep for several days. He was found to have an enormously dilated heart with general venous stasis. The primary condition was a rheumatic endocarditis and myocarditis, the former being localized especially at the mitral valve. The lower border of the liver reached to the level of the umbilicus at the midclavicular line; yet the patient said he had never had any discomfort over the enlarged organ.

Finally, a patient may be so mentally clouded by toxic or other processes that sensory stimuli may be unregistered in his sensorium. Fortunately, the importance of the repeated physical examination of such patients is generally conceded, and is now fairly generally practised. Only too frequently, however, failure of the patient to complain of pain, results in the failure of the physician to recognize serious conditions. In still more aggravated instances, even in the presence of subjective symptoms which should call the attention of the practitioner to its presence, a local condition which demands prompt relief may be disregarded. The frequency of failure to recognize so common a condition as an over-distended urinary bladder, is a matter of general knowledge, and yet patients repeatedly enter hospital wards suffering from this condition.

Case VI.—C. M., female, *aet.* thirty-eight. Admitted to the Pittsburgh Hospital complaining of pain in the left infrascapular region, the hypogastrium, and along the spine. She presented a complete paraplegia. The urinary bladder was found to be distended to a point one inch below the umbilicus, and to contain 2,000 c.c. of urine.

Pathogenic processes in the right pleural cavity are very apt to develop in an insidious manner. The importance of a routine examination of both bases, and especially of the right base, has been so often insisted upon that the careful diagnostician is more apt to make the error of regarding with suspicion an area of dullness at the right base due to a high diaphragm, than to overlook an effusion.

Often in a carefully studied case, indubitable signs of effusion at the

right base will be detected in a patient who is making little complaint of local pain.

Case VII.—J. B. H., *aet.* seventy-three, had been under treatment for three weeks for suppurative cholecystitis with cardiovascular and renal complications, and a terminal pneumonia. Right hypochondriac pain had been marked during the first ten days, at the end of which time a peritoneal abscess had been evacuated by incision. Subsequently, cardiovascular and toxic symptoms were the more prominent features. The right hypochondriac pain was no longer severe, and was often absent. During this period, signs of the presence of fluid in the right pleural cavity suddenly appeared. The exploring needle revealed the presence of pus. A rib was resected, and a pyothorax evacuated by Dr. J. D. Singley at the Pittsburgh Hospital. The examining finger detected a large opening in the diaphragm through which the liver could be distinctly felt. The pyothorax had formed, and probably the subdiaphragmatic abscess ruptured during the period of comparative freedom from pain.

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THE FALLACY OF WARMED ETHER VAPOR.

By M. G. SEELIG, M. D., of St. Louis,
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In recent literature, attention has been directed so forcibly to the necessity of warming anesthetics that one feels almost impelled to adopt some procedure that will accomplish this purpose. Davis¹ and Gwathmey² state in most emphatic fashion that the interests of a patient subjected to anesthesia are best conserved only when he is allowed to inhale a vapor that has been previously warmed. This preliminary warming is supposed not only to aid in preserving the general body temperature, but also to guard directly against refrigeration of the lung and consequent post-operative pneumonia.

In order to warm an anesthetic vapor, it is necessary to add to the already complex armamentarium of the operating-room another more or less complicated and expensive apparatus. We do not believe that such an addition is necessary. The whole question of warmed ether vapor or warmed vapor of any kind is fundamentally a question that has to do with the physics of gases, one which could be answered, indeed, by the fundamental laws of physics without any further experimentation. We need not consider the somewhat complicated laws governing density, pressure and temperature of gases, or the phenomena attendant upon vaporization. It will suffice to concentrate upon the one physical fact that the specific heat of gases is low. This statement signifies two things: First, that it takes only a small amount of heat to affect markedly the temperature of a gas, and, secondly, that a gas has small capacity for holding its heat. In other words, referring to the specific of gases as being "low" is analogous to referring to an individual's tolerance for carbohydrates as being low; he is profoundly affected by comparatively small quantities, and passes these quantities off rapidly, instead of holding and utilizing them as does the normal individual. We must assume then, according to the natural law, that even if we heated ether vapor to a considerable degree, the gas would lose practically all its heat before we could deliver it to the patient. Ether boils at about 97° F., and the resultant vapor cannot possibly be driven to a higher temperature, unless it is held under pressure. When ether vapor is driven through a very circuitous coil that is heated, it is for a time under slight pressure and may take on a degree of heat higher than 97° (as shown in our experiments), but the moment the vapor emerges from its field of compression, it expands and cools with astonishing rapidity.

In order to demonstrate the small capacity of ether vapor for heat, we carried out the following experiments (see Fig. 1). An ordinary laboratory wash bottle was filled about half full with ether. To the inlet tube there was attached the bulb of a Pacquelin cautery. By means of a rubber tube, the outlet flow was carried to a lead pipe, one meter long with one-half centimeter lumen, coiled up as a "worm." This lead worm was immersed in a beaker of water that was brought to and kept at the boiling point on an electric stove. Fixed on the distal end of the lead coil was a thick-walled rubber tube one meter long, with small slits cut in it at varying distances (10, 40 and 60 cm.) from the end of the lead coil. The water in the beaker was brought to a boil and then ether vapor was pumped through the coil gently, about eighteen times to the minute. As the ether vapor emerged from the heated coil, its temperature was

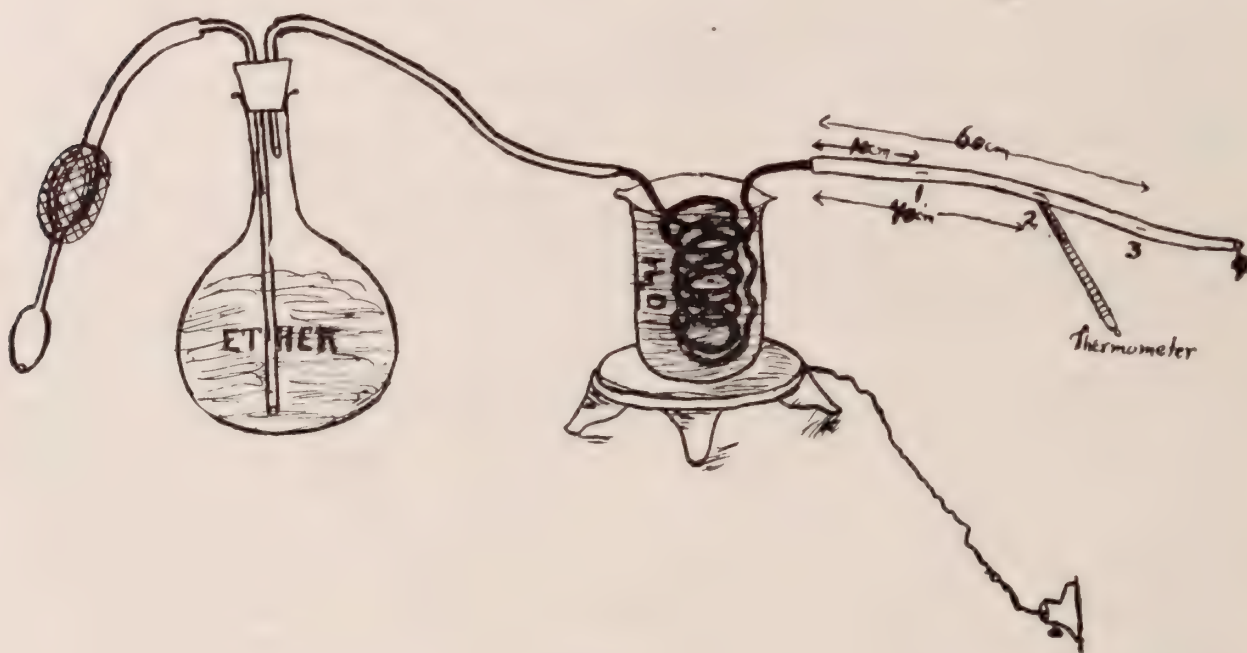


Fig. 1.

measured at the various distances along the tube by a thermometer, whose bulb was projected into the rubber tube, through the slits mentioned above. The experiment was carried on at a room temperature of 26.5° C. The ether vapor as it emerged from the end of the tube (1 meter from the site of heating) measured 26.9° C. If it was pumped through the coil violently and rapidly, it measured 28° C. As it emerged 60 cm. from the coil, it measured 28.9° C. At a point 40 cm. from the coil, it measured 28° C. At a point only 10 cm. from the coil it measured 30° C., and on violent, rapid pumping, 52° C. In other words, despite the fact that the ether vapor was driven through a temperature approximating 100° C., it radiated its acquired heat so rapidly that at a distance of one meter from the source of heat it had practically assumed room temperature.

We showed conversely that chilled vapor also tends to assume room temperature with great rapidity. If ether is vaporized rapidly the well-

known phenomenon of chilling occurs. We measured the degree of chilling by the simple apparatus shown in Fig. 2, and found that although the temperature at 2 could be forced down 10° C., the ether vapor emerged at 4 at little below room temperature (0.5° C.).

These experiments only confirm the law of low specific heat of gases, yet they demonstrate rather forcibly the futility of warming ether vapor before delivering it to the patient. The experience of the tobacco smoker furnishes an equally emphatic confirmation of the rapidity with which gases lose their heat. The air drawn into the mouth of a smoker, over the glowing fire of a pipe or cigar, measures more than 500° F. (one physicist estimates it as $1,500^{\circ}$ F.) when it is in contact with the fire; and yet when it reaches the sensitive buccal mucous membrane, it is not warm enough to produce a heat stimulus.

Of course, it must be granted that an experiment carried on *in vitro* cannot reproduce the phenomena which occur in the human body. In

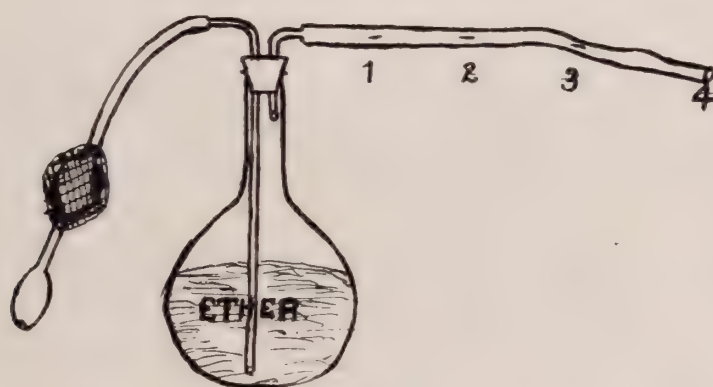


Fig. 2.

order, therefore, to test the question of lung refrigeration, the following procedure was resorted to. A dog was tracheotomized under local anesthesia, and a delicately calibrated thermometer inserted through the tracheal wound as far as the division of the bronchi. After a few minutes a reading was taken, and then ether was administered by the drop method. The column of mercury did not vary. Ether was then poured on the mask in very liberal quantities, so as to insure rapid evaporation and chilling, but even this procedure caused no drop in the column of mercury. After the animal had been under the anesthesia for some time a drop of 0.8° C. was noted, but this drop occurred also when the ether vapor was passed through hot water. The fact that the bronchial air is not lowered in temperature, despite the fact that the inspired air is cooler than normal, is explained by the normal rapidity with which the inspired air assumes room temperature, plus the fact that the warm nasal, pharyngeal and tracheal passages all tend to aid in the process of warming.

The experimental work of Hoffman³ demonstrates that it is practically impossible to measure with scientific accuracy the temperature of the inspired and expired air during anesthesia. But such measurements, from a practical point of view, are not necessary. We may rest content with

the simple fact that a warmed vapor will not stay warmed unless it is held under pressure. We have been led astray in our reasoning by the sight of ice crystals on the ether mask, or frost on the nitrous oxide gas cylinder. Indeed, we have been led so far astray, as to lose sight of one of the fundamental facts in the administration of anesthetics—namely, when ether is administered by the drop method, its rapid evaporation robs the surrounding atmosphere of latent heat, thus perceptibly cooling it. This cooled air can take up only a moderate amount of ether vapor by reason of the fact that it is cooled, and thus we are furnished with a safeguard against over-saturating the patient with ether. This physical fact it is, which has contributed so much towards making the open method of administering ether so safe and therefore so popular. If we bear in mind the rapidity with which vapors part with heat, we shall probably not concern ourselves much with securing special warming apparatus.

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INFLAMMATORY TUMORS PRODUCING INTESTINAL OBSTRUCTION.*

By A. PRIMROSE, M. B., C. M., Edin., M. R. C. S. Eng., of Toronto,
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Considerable attention has been called in recent years to diverticulitis of the sigmoid loop of the large bowel, and in certain of these cases tumors of inflammatory origin have attained a considerable size. Similarly the appendix may be the seat of a chronic infection resulting in a tumor formation of such consistence and dimensions as to lead one to suspect new growth. Clinical experience has shown that while acute inflammation is exceedingly common in the right iliac region due to an infected appendix, we may likewise get acute diverticulitis of the sigmoid in the left lower abdomen. One has also observed that an infective agent which produces an appendicitis may synchronously originate a sigmoiditis. Thus recently I removed a gangrenous retrocecal appendix in a child fourteen years of age, and a few days subsequently opened an abscess in the left iliac fossa which ran a course quite independently of the trouble in the right iliac region.

Three of the cases I report to-day are of the chronic inflammatory type having their origin, in all probability, either in a chronic infection of the appendix or a similar infection of the sigmoid. The fourth case developed as the result of postpartum infection.

CASE I.—*Tumor in Pelvis resembling malignant growth of the rectum.* W. H., male, *aet.* forty-seven, had complained of progressive difficulty in getting the bowels to move for four months prior to consultation with me. When I saw him first with Dr. Meldrum, of New Durham, obstruction was almost complete, he suffered much pain after taking food, had occasional attacks of vomiting and after free purgation had passed fluid feces only. He had never passed blood or mucus. He had lost 15 or 20 lbs. in weight. On examination there was some distension, but a tumor was easily palpable in the left iliac fossa. Per rectum a mass was found filling the pelvis. His temperature was 101° F., pulse 92 and white blood-count 20,400.

On opening the abdomen in the middle line I found a mass in which the sigmoid and rectum were embedded (Fig. 1). Finding a line of cleavage I separated this from the pelvic wall on the left side. The terminal portion of the appendix was embedded in this mass. I removed the appendix and then endeavored to perform an inguinal colostomy, but

*Read before the Ontario Medical Association.

as the sigmoid was unusually short and there was no sigmoid mesentery, I divided the bowel transversely and secured a Paul's tube in either end (Fig 2). He made a good recovery with a fecal fistula. Three weeks subsequently I removed a portion of the mass by operation through the rectum and the pathologist reported it purely inflammatory in character. Eight weeks after the first operation I was able to pass a No. 10 English catheter from the lower sigmoid opening down through the anus, the distance by measurement between the two openings being exactly twelve inches. He returned to his farm in the country and came

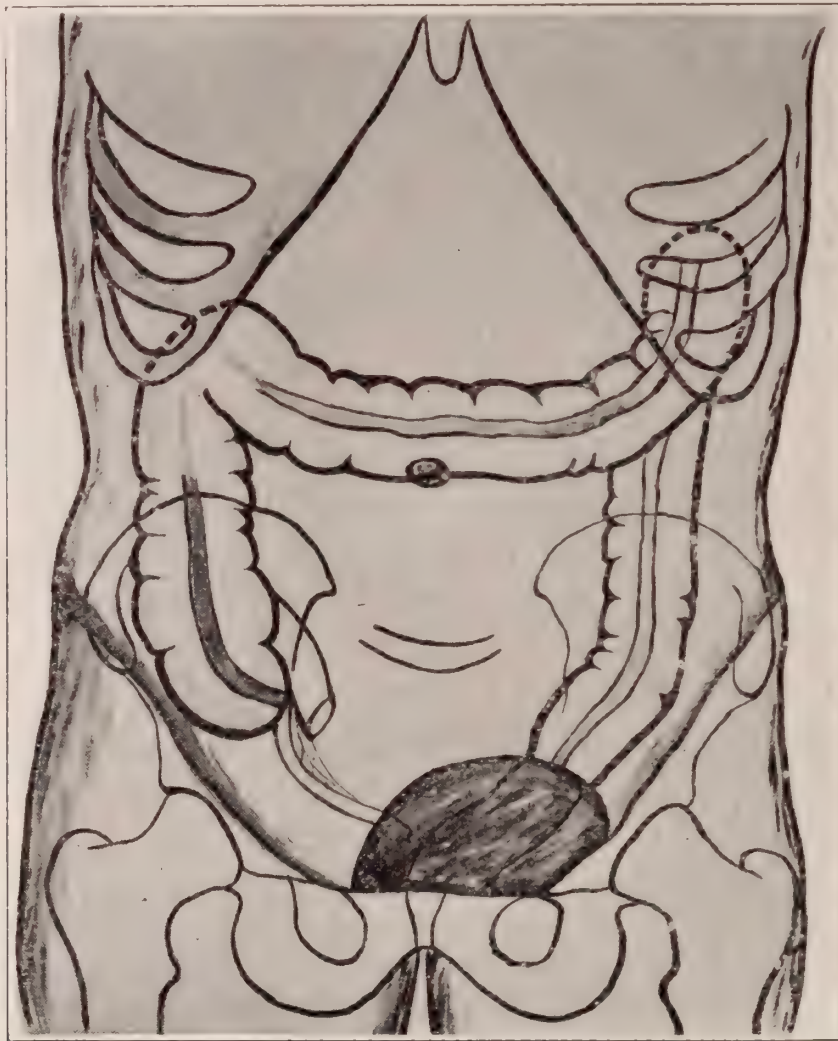


Fig. 1.—Intestinal obstruction produced by an inflammatory tumor in the pelvis resembling new growth.

back greatly improved in health and I now found, three and a half months after performing colostomy, that the tumor had largely disappeared. I passed a large rectal bougie one inch in diameter through the lower segment of the bowel without difficulty; I then performed an end to end anastomosis at the seat of the colostomy operation. This was very readily accomplished over a rubber tube as recommended by W. J. Mayo (Fig. 3). He made an uninterrupted recovery and is now in perfect health.

CASE II.—*Tumor resembling sarcoma arising from the left iliac bone.* E. B., female, *aet.* twenty-two, had the appendix removed for acute infection five months before she consulted me. When she came under my observation she had a tumor in the left iliac region which she had discovered three weeks previously. There was a gradually progressive difficulty in getting the bowels to move. An ovoid mass regular in outline and firmly connected with the iliac bone extended upwards and inwards within two inches of the navel (Fig. 4). It was tender on pressure but no fluctuation could be detected. The temperature ranged from 99 to 100° F., pulse 80, the leucocyte count showed 18,000 white cells. The *x*-ray picture revealed a blurring in the region of the tumor but nothing more. She had lost weight to a considerable degree.

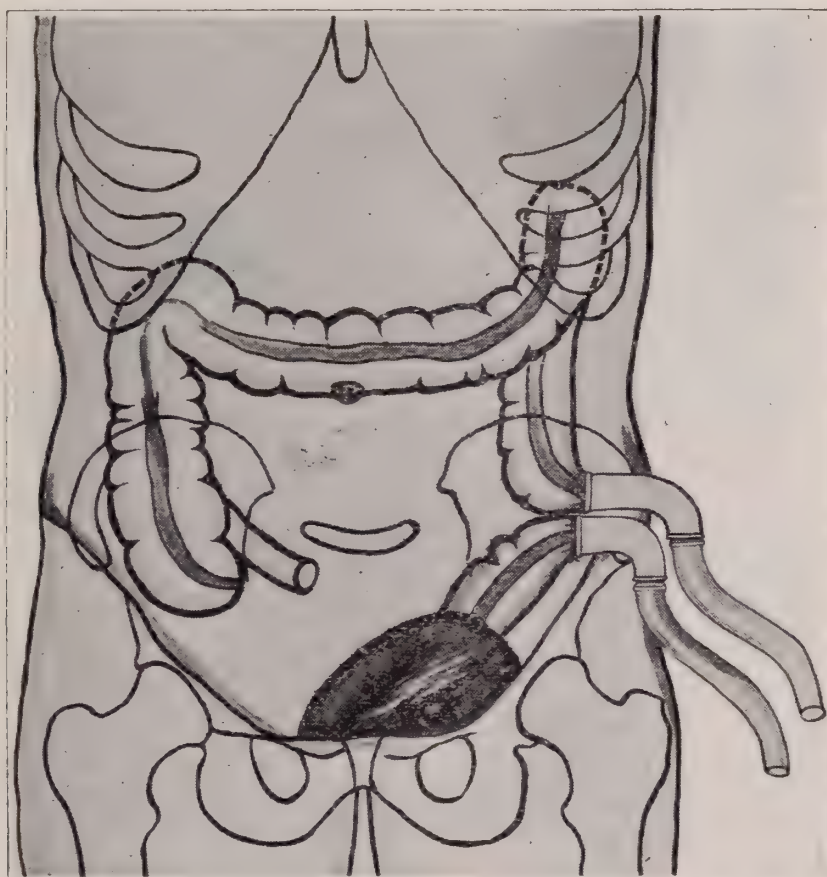


Fig. 2.—Fecal fistula formed by the use of 2 Paul's tubes for the relief of intestinal obstruction caused by inflammatory tumor.

On opening the abdomen the mass was found fixed to the bone in the left iliac fossa. Finding a line of cleavage it was separated from the bone and was now found to involve the sigmoid colon and was intimately adherent to the left broad ligament and the uterus. A portion of the tumor the size of a golf ball was removed. This left a raw bleeding cavity which was packed with gauze. The pathologist reported the mass to consist of inflammatory tissue solely; there was no localized collection of pus but numerous pus cells were distributed in the tissue. Subsequent to the operation she developed a fecal fistula connected with the sigmoid, this closed spontaneously and all trace of the tumor slowly disappeared so that she was perfectly well four months after operation.

CASE III.—*Tumor in the pelvis which had been diagnosed as sarcoma.* Miss M., *aet.* forty-five. In September, 1909, she had an attack of peritonitis with vomiting and pain. A second attack developed in July, 1910, and in November of the same year a third attack. Two weeks subsequently she had a fourth attack and in January, 1911, a fifth attack during which she passed fetid pus per rectum. She had lost very greatly in weight and a fixed mass could be felt occupying the pelvis. This was tender on pressure. There was considerable difficulty in getting the bowels to move and at times complete obstruction threatened. Temperature was 97° F., pulse 106 and leucocyte count 6,900 white cells.

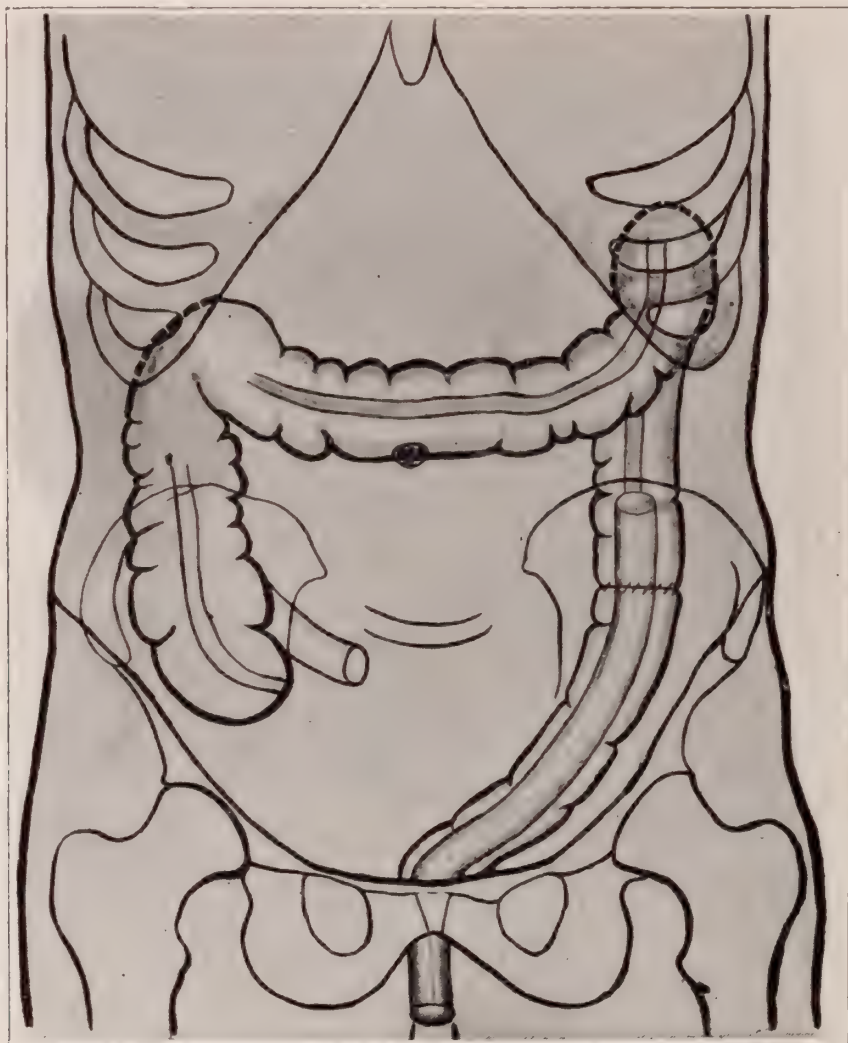


Fig. 3.—Repair of fecal fistula over a tube introduced into the sigmoid and rectum.

On February 10th, 1911, I opened the abdomen and found a mass firmly adherent to the uterus and rectum in Douglas' pouch, the appendix was embedded in this and a loop of small intestine was similarly tied down and acutely kinked (Fig. 5). The appendix was removed. The small intestine when freed was greatly constricted at the point of kinking and a perforation existed near by. The damaged portion of bowel was resected and an end to end anastomosis effected. While disturbing the mass a small abscess was opened and a culture from this showed the bacillus of tubercle.

The patient subsequently made a good recovery, has gained in flesh and is now enjoying good health.

CASE IV.—*Inflammatory mass developing during the puerperium and producing intestinal obstruction.* Mrs. T., aet. forty, a patient under the care of my colleague, Dr. F. N. G. Starr. She had been delivered of a child twelve weeks previously, followed by septic trouble which proved to be due to a streptococcus. This first appeared as a membranous exudate over the cervix with subsequent infiltration of the left broad ligament. The bowel was evidently pressed upon and symptoms of intestinal obstruction occurred.

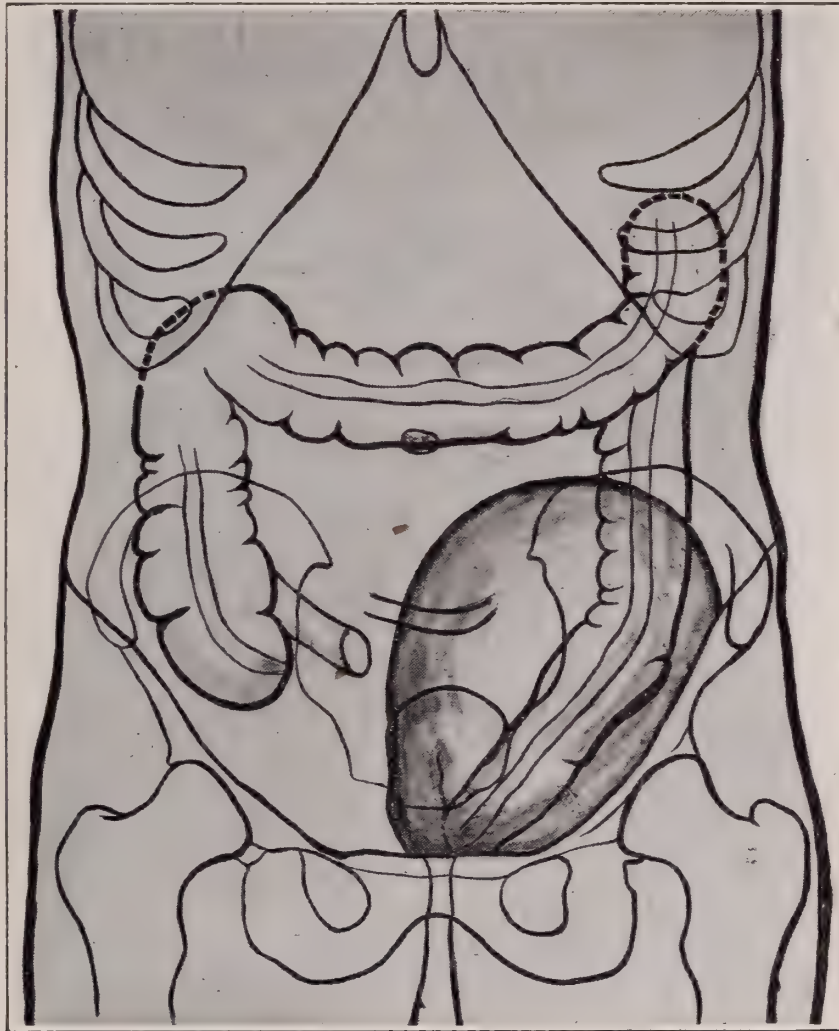


Fig. 4.—Inflammatory tumor attached to left iliac bone, causing obstruction and resembling sarcoma. Secondary to appendicectomy.

Dr. Starr opened up the mass from which serous fluid exuded freely and her symptoms of obstruction subsided. Subsequently the right broad ligament was similarly invaded causing obstruction which was relieved by an operation similar to the first. A few weeks afterwards obstruction became complete and immediate interference was necessary to save her life. My colleague being absent from the city, I opened the abdomen in the middle line and inserted a Paul's tube in the distended loop of ileum which presented. The patient had a slow convalescence but eventually made a complete recovery. Dr. Starr successfully closed the fistula by a plastic operation.

These 4 cases illustrate a class of inflammatory tumors causing obstruction of the bowel concerning which very little has been published. Many monographs have been written on intestinal obstruction in which no reference is made to such tumor formations as a cause. Doubtless many tumors similar to the first three recorded here have been diagnosed in the past as neoplastic, and under such circumstances heroic attempts have been made to eradicate them followed by a high mortality. My object in recording these cases is to emphasize the fact that when such in-

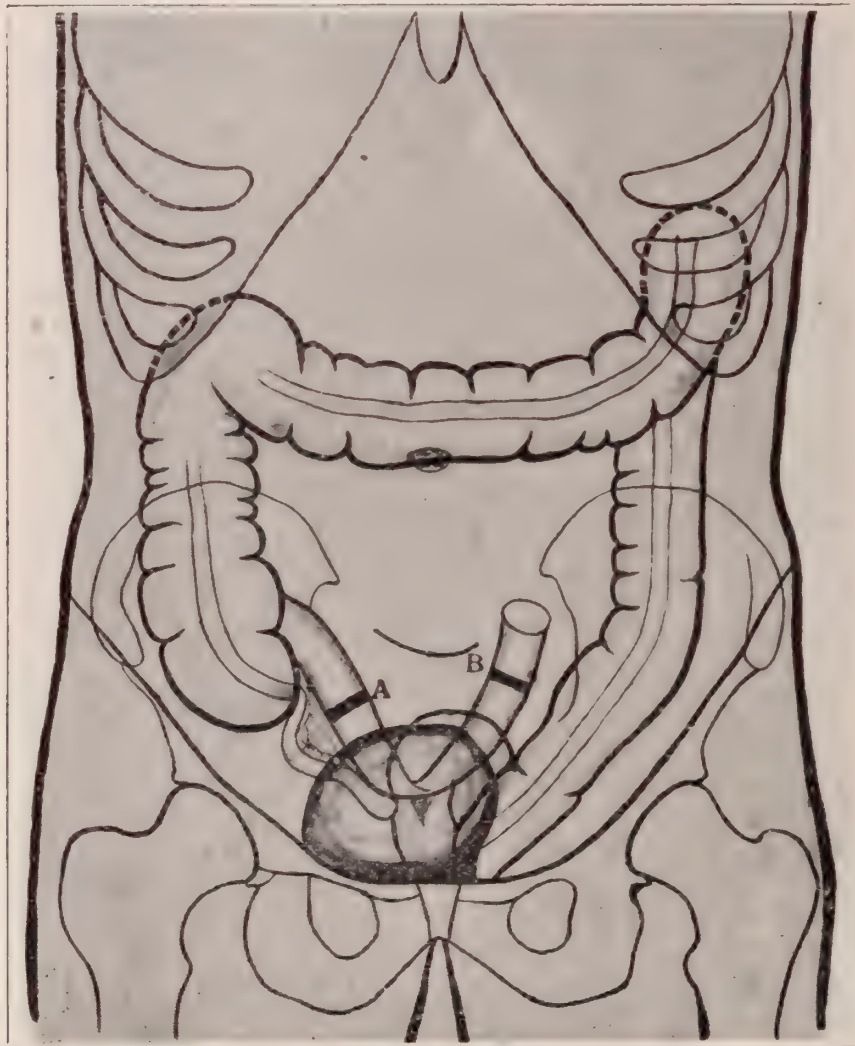


Fig. 5.—Inflammatory tumor which had been diagnosed as new growth, causing obstruction. A kink of the ileum exists and this with the appendix is imbedded in the mass. Resection of bowel and end to end anastomosis was performed at A. and B.

flammatory tumors exist the operative interference should be of the simplest variety, such as the creation of a fecal fistula or the resection of a damaged portion of bowel. The growth itself may be left to nature and will eventually disappear spontaneously, after which such plastic operation as may be necessary is performed to restore normal conditions.

While writing this paper I received a communication from my friend Dr. W. Gunn of Clinton, Ont., in which he records the following case:—

The patient was a young woman and an operation was performed for

the removal of an ovarian cyst and the appendix. The operation was not difficult and there were no adhesions to speak of. About four weeks afterwards symptoms of acute intestinal obstruction occurred necessitating immediate operation. A large mass simulating new growth was found involving and completely occluding the lower six or eight inches of the ascending colon. The wall of the bowel was half an inch thick or more and the infiltration around it was enormous. The bowel was separated as far as possible and a lateral anastomosis was made between the caecum and the ascending colon. There was no difficulty in accomplishing this as the colon was mobilized by previous dissection. The patient made a good recovery and has remained well since the operation which was performed about two years ago.

AN ESTIMATE OF FREUD'S THEORY OF THE NEUROSES
AND ITS VALUE TO THE NEUROLOGIST.*

By SIDNEY I. SCHWAB, M. D., of St. Louis.

I know of no more difficult task than to present to an audience of neurologists or at least to those whose presence here to-night indicates an interest more or less vital in neurology, a résumé of the Freudian psychology in such a way that its presentation shall not partake of the unbounded enthusiasm of the Freudians or the almost malignant criticism of their opponents. A purely objective attitude to the Freudian philosophy implies, according to most of them, an ignorance or misunderstanding of its literature and, on the other hand, suggests to its critics a fellow-feeling of detraction.

In responding to the invitation of your honored president to give to the Philadelphia Neurological Society some aspect of this much-discussed subject, I felt keenly the limitations within which I might be bold enough to attempt so grave a piece of exposition. Yet the opportunity seems so pregnant with possibilities that my own feeling of self-consciousness was soon lost sight of in the larger aspect of the importance of the subject and the widespread uncertainty regarding it.

My own qualifications for such a task are chiefly based on a year's study, and more or less close personal contact with Freud some years ago when his fame was limited to a small group of Vienna graduate-students known contemptuously as *die Anhänger von Freud*; on a careful study of the Freudian literature covering some fifteen years and now growing to huge proportions; and on many attempts of my own, some abortive and some more or less complete in carrying out Freud's ideas and methods into the actual treatment of neurological cases.

With these qualifications, however modest they might appear, I shall attempt to present a résumé of the Freudian philosophy under the following heads: (1) The idea and development of the theories of hysteria and the other neuroses; (2) the meaning, use, and technique of psychoanalysis; (3) the dream interpretation; (4) the association word-tests of Jung, and (5) a few words in regard to the utility of this form of treatment in the hands of an American neurologist with American patients. In passing I might say that the temperamental differences, to put it generally, between the American and Continental types seem to

*Read by invitation before the Philadelphia Neurological Society, February 24th, 1911.

me worth considering in trying to explain our many failures and our rather narrow limitation in respect to the selection of suitable cases.

In the *Neurologisches Centralblatt* for 1893 appeared a paper by Breuer and Freud, entitled "Ueber den Psychischen Mechanismus Hysterischen Phänomene," later elaborated in the well-known monograph, "Studien ueber Hysterie," which appeared in 1895. In these two papers were given the results of studies on hysterical cases carried out by means of light hypnosis and with the purpose of studying hysterical symptoms. At first there was no therapeutic intention back of these investigations, but as each hysterical symptom was followed to its point of origin it was found, much to the astonishment of the two investigators, that it promptly and mysteriously disappeared.

We found, they say, to our astonishment that the individual hysterical symptoms promptly disappeared and did not return, as soon as we succeeded in bringing to light the memory of the causes active in their production, and were able to deliver into consciousness the accompanying affect. This was the result if the patient could describe the occurrence in great detail and put into words the affective phenomena with which it was accompanied and bound up.

The notion that the memory of a psychical trauma acts psychically in the way a foreign body acts physically followed naturally, and the logical conclusion to be drawn from this idea was that its removal by some psychical process akin to its origin would result in the patient's relief.

A further development of this theory and the affect following karthartic analysis made plausible the dictum that the hysteric suffers for the most part from reminiscences.

The importance of a memory in this scheme of associative phenomena depends upon the force with which it reacts, that is whether the affective event is energetically reacted to or not. By reaction is meant the total group of voluntary and involuntary reflexes, physical or psychical, with which by experience the affective constituent is unloaded. If the reaction is sufficiently vigorous, a large part of the affect tends to disappear; if the reaction is suppressed then the affect remains bound up intimately with the memory. The reaction, therefore, has a karthartic affect only when it is adequate. In normal individuals there are at least two important mechanisms by which the adequate reaction may be supplanted. One is by means of a process of departure from the distinctive memory, or what Freud calls *abreagiren*, and the other is through chains of further association. In either instance reaction is, as it were, gradually and successively diminished. The karthartic method as originally used, therefore finds its therapeutic principle based upon the following facts: It increases the effectiveness of the insufficiently reacted idea to the extent that it allows the enclosed or shut-in affect to free itself through speech and permits it to come into contact with associative correction by its introduction into normal consciousness.

The method used in these early studies was, as it is remembered, a light degree of hypnosis. This was later given up and in its place free association was substituted, upon which, with certain unimportant modifications, the present method of psycho-analysis is based.

Up to this point in the development of the Freudian psychology little is said about, and not much emphasis placed, upon etiology. Some kind of trauma is assured even in the early studies; such psychical traumata were concerned with happenings which took place in the very early years of the patient's life, chiefly in infancy. It was with the assertion that the traumata were all of a sexual character, that the storm of protest arose from which discussion of the Freudian philosophy is at the present time clouded.

It is of less importance to dwell upon the separation which Freud has insisted upon of neurasthenia from states of anxiousness (*Angst Neurosen*), nor yet with the fine distinction, etiologically, between hysteria as a result of early sexual traumata and neurasthenia largely the result of masturbation, or whether *angst neurosen* are due to coitus interruptus or insufficient sexual reaction. All these to my mind are of less significance than the conception which Freud has in respect to their complete mechanism.

In "Drei Abhandlungen zu Sexual Theorie," appearing in 1905 is found a full statement to be modified as further investigation furnishes additional facts of Freud's view on the subject of sexuality. An excellent translation in English of this paper has been published by Brill.

There is perhaps no part of the Freudian theory which is more amazing or which is open to so much criticism as these now well-known papers. I scarcely know of anything in the literature of neurology more difficult to understand and more impossible to carry with one than the contents, deductions and conclusions of these papers. Yet they should be understood in order to appreciate the conception of the sexual etiology of the neuroses. I shall pass by as seemingly unimportant the Freudian notion of infantile perversions, fetishism, the sexual rôle played by the mucous membranes of the anus and mouth and his theory of bi-sexuality, as being somewhat foreign to our immediate needs, and come to the significant statement contained in the chapter on sexual aberrations. The claim is here made with emphasis that there is only one means through which a knowledge of the sexual problems of psychoneurotics can be obtained, and that is by means of psycho-analytic investigation. It is noteworthy that at the time of the publication of these papers, Freud included under the term psychoneuroses,—hysteria, obsessions, neurasthenia, and probably paranoia.

The psychoneuroses are sexual in origin in the sense that the sexual impulses furnish to them their activating power. The symptoms themselves thus become the sexual activities of the patient. The normal outlet of these activities has been cut off by a special process called repression. The thought-formations which are retained in the unconscious state strive

for expression,—that is for discharge in conformity with their affective value. They find such in hysteria through a process of conversion which expresses itself by means of somatic phenomena. These are transferred into hysterical symptoms, that is, they become what is later expressed in the clinical picture of hysteria.

The thought-formations are brought to light by the facts obtained in the course of psycho-analysis. These characteristics are regarded by Freud as open to study in any group of marked hysterics. One of these characteristics is an exaggeration of the resistance against the sexual impulse as shown by shame and loathing; the other characteristic is a pathologically developed sexual desire. In these contrasting features arises the conflict, the result of which is the transformation of the libidinous strivings into expressions of physical activity, which we have come to know as symptoms.

The chapter on infantile sexuality contains the strangest of all Freudian ideas, and to the inquiring mind they are the most doubtful elements of the whole system, with the possible exception of dream symbols. In its originality, perhaps, the notion that an infant of a year or two has an active sexual existence, with libido, choice of loved objects, and, to a certain degree, the psychical features of a more highly-developed individual, far transcends any other of the curiosities of the Freudian school. One's critical impulse is entirely subdued; either we must accept as true the infant sexuality because it is incapable of either proof or disproof or refuse it credence on the score of its utter absurdity. To do the latter would of course be fatal to the experimental side of the question, and to accept the former alternative creates a too ready acceptance of anything that is said and stamped with the Freudian approval.

It seems to me proper to take towards this question a purely expectant attitude,—that is to let the facts remain as such until our own experience in actual cases proves their right to acceptance or the reverse.

As far as can be set down in an incomplete and brief form, Freud advances the proposition that the new-born child brings with it into the world the germs of sexual feeling which continue to develop for some time and then succumb to a process of progressive suppression. The sexual life of a child manifests itself in the third or fourth year in some form accessible to observation. It is during this period of total or partial latency that there develop the psychic forces which later act as inhibitory factors on the sexual life. These psychic forces are loathing, shame, moral and esthetic ideas.

The means by which this is brought about is sublimation, which can be defined as the process of deviating sexual motive powers from one set of sexual aims or objects to new aims or objects. In the course of this process there is built up a mass of sexual potential activities which remain ineffective on account of the anatomical and physiological lack of development of the procreative organs. This remains the chief char-

acter of the period of sexual latency; if they did manifest themselves they would naturally be perverse as they would originate from erogenous zones, which later would be associated with feelings of loathing, shame and morality. Now when the age of puberty is reached, there is naturally an unconscious conflict between the breaking through of the impulses hitherto confined to the latent period and the early restrictions and repressions.

Among the manifestations of infantile sexuality are mentioned thumb-sucking, auto-erotism and others of like nature. The erogenous zones, anus, genital region, lips are the regions where the perverse sexual activity takes place and the mechanism consists in some form of a mechanical excitation. Given in an infant the presence of sexuality, the mechanical means of putting it into activity and zones to furnish the peripheral nerve stimulation, then the possibility of various kinds of sexual activity is furnished. The child becoming an object of sexual gratification to others, nurse, adults, and other children, its latent period of sexuality is transferred into an active one. By repetition, at the hands of the child itself in order to re-experience the pleasurable feelings associated with the act in the first place, a complete mechanism for the working out of the sexual traumata is formed. This is found as the chief etiological factor in an adult hysteria as discovered by psychoanalysis.

Jung, in what is perhaps the best exposition of the Freudian theory yet published, has with singular insight shown how Freud's hypotheses are but a natural development of Janet's work on mental dissociation. Out of the facts of psychical dissociation and unconscious psychical automatism is developed the Freudian formula of the problem of hysteria. A further essential step lies in Binswanger's dictum of the etiological significance of the affect. Both these premises, together with experiences derived from the theories of suggestion, form the groundwork of the idea, practically everywhere admitted to be true, that hysteria is a psychogenetic neurosis. Freud's work is largely directed to the study of the mechanism by which hysterical phenomena are produced. It aims at nothing less than to fill up the gap, in a most minute way, which lies between etiological beginnings and eventuating symptoms.

The original karthartic method, the mechanism of which is by means of light hypnosis, aimed to connect the individual symptoms with the traumatically affective foundation upon which they rested. As a result the affect was elevated into consciousness and reacted to by a series of normal emotional expressions. In this early method there cannot be much doubt that the patient followed the lead of the physician, and was suggestively influenced as the interrogations naturally became more direct and more pointedly limited to the progressively narrowing field in which were contained the definite events which were etilogically significant.

From 1904 on, Freud's method was changed entirely to one of free association in which the possibility of direct suggestive effect was entirely eliminated. The patient is no longer led by the physician, but is given the freest possible opportunity to tell everything that happens to be associated with any given train of thought. In effect, it is the patient who makes the analysis. The duty of the analyst is therefore to keep an account of the various experiences related by the patient, and from time to time to call to his attention the importance of this or that fact in the chain of reminiscences. Freud is enabled to hit upon the correct things to emphasize by virtue of his large experience gained by a large number of cases analyzed and by the reactions of the patient to the events which he relates.

It can easily be seen from this how very much more complicated the method has become, and how much more subtle the technique in this sense is. The aim of the analyst has thus come to be an effort to bring into the patient's consciousness all the false associative chains originating from a complex, and thereby to disentangle them so that the patient gradually comes to gain a deep insight into his own clinical picture and through this to arrive at an absolutely objective attitude towards his own complex. This is the educational-feature which Jung and Prof. Putnam have placed particular emphasis upon; the former pointing out a certain resemblance between the Freudian psycho-analysis and the method by which Dubois is able to correct the false attitude of his patients to their symptoms.

It is evident that the method of itself is simple enough, but the appreciation of the minute reactions of the patient, in the course of the analysis, demands psychical insight of so subtle a kind as to be beyond the reach of any but a few. It is questionable to my own mind if anyone has mastered the technique in its far-reaching aspect outside of Freud himself. A comparison of the published accounts of psycho-analytic procedures in cases at the hands of others—and their number now is very large—with Freud's own, notably his "Bruchstueck Einem Hysterischen Fall" and his "Analyse der Phobie Eines Fuenf Jæhrigen Knaben," leads one to believe that only the master himself has a sufficient fund of knowledge and experience to guide him into the dark and intricate places where the sexual reminiscences are hidden from view.

For the lesser endowed, whether by lack of experience or by less acute psychological insight, a way has been opened through the method of word-association tests of Jung. By its use one is enabled at least to approach somewhat closer to the paths which can be profitably followed. Ernest Jones in this country has given in several places a clear exposition of this method, which briefly consists in taking, as starting points, associations accompanied chiefly by delayed association time-tests. These are followed by re-association until their final impingement upon emotional experiences, or rather I should say affective experiences tinged largely with the sexual atmosphere.

I cannot emphasize too greatly the aid which I myself have obtained through this procedure, and how the fog has been lifted from what would otherwise have been a darkened chaos of disconnected events often separated by such long periods of time that their relationship seemed utterly out of the question. How Freud stands upon this interpolation of his technique, I am unable to state. As far as I know he neither makes use of it nor mentions it except in one place and that somewhat vaguely, in touching upon the fact that Jung has proved the truth of some of his theories by approaching them in this way. I should like to conclude this part of my paper by quoting a résumé of Jung's on the Freud Hysteria Concept. First, there develops upon a constitutional anomaly certain precocious sexual activities of a more or less perverse nature. Secondly, these activities do not lead at first to hysterical symptoms in themselves. Thirdly, at the time of puberty (which psychologically is of an earlier date than the physical age of puberty) the phantasy is forced into channels tinged by infantile sexual activities. Fourthly, the phantasy, strengthened by means of the constitutional (affective) forces, leads to the formation of complexes which are not in harmony with the rest of the content of consciousness, and are therefore overlaid by the process of supplantation which is active through modesty and disgust. Fifthly, in this process of supplantation the transference of the libido to a loved individual is carried. Out of this the emotional conflict arises, which in its turn gives an opportunity for the outbreak of the true disease. Sixthly, the origin of the symptoms of hysteria are due therefore to the conflict of the libido against the process of supplantation. They reveal themselves, therefore, as nothing other than an abnormal sexual activity.

I am left with but little time to devote to the *Traumdeutung*, perhaps the most original of the whole Freudian psychology, and to which Freud himself has given the greatest emphasis. I am under the impression that to Freud this is his chief claim to scientific recognition. It seems easy enough to appreciate, in such a work as the "Bruchstueck," the part that dream interpretation plays in his analysis, but it is wellnigh a hopeless task to set down on a page or so, the gist of this curious and elusive expounding of dream phenomena. It is much more of a task to connect with the rest of the Freudian hypothesis the dream interpretation and to give to it its proper place in his method and technique.

The sources of information concerning the dream theory are the book called "Traumdeutung," now in its second edition, not yet translated; "Ueber den Traum," a more or less popular exposition found in one of the series published in "Grenzfragen des Nerven und Seelen Lebens" issued by Loewenfeld and Kurella; and scattered references to dream interpretation found throughout the whole Freudian literature.

Freud's insight into the dream phenomena is derived largely from the experiences obtained in the psycho-analysis of neurotics. Ideas of

anxiousness (*Angst Ideen*) and imperative ideas stand in a singular way unfriendly to the normal consciousness as dreams stand to the awakening consciousness. Their origin is just as unknown to consciousness as are dreams. There is then the same unknown territory between the origin of a dream and its manifestations as there is between the origin of an imperative idea and its final expression. The associative chain is to be followed out in one instance as in the other by a similar process of analysis.

By the procedure of association free from any suggestion, the dream events can be broadened out into a mass of psychical material.

It is readily apparent that in any dream there are two kinds of psychical stuff. One is the evident material of the dream experience, the facts as it were, of the dream narrative; this is the manifest dream content. The other is the associative end-results to which the events of the dream, by methods of analysis, lead. This is called the latent dream content. The phenomena underlying the evolution of latent to manifest dream content is called dream work (*Traum Arbeit*). The opposite of this, which aims to unravel the associative chain from manifest to latent dream content is called dream analysis. In respect to the relation between latent and manifest dream content, dreams can be divided into three classes. First, there are the dreams which are sensible and immediately understandable, that is a presentation which encounters no sense of strangeness in our psychical life. Next, there are such dreams, which although they hang together, and are in a measure sensible, occasion a reaction and a feeling of strangeness in our psychical life. Such is the case if one should dream that some beloved one dies of the plague when there is no expectation or fear of such a thing, and we ask ourselves in great astonishment how could we have come to such an idea. Then there are the dreams which appear senseless and confused without meaning or connection. The majority of dreams belong to the third category.

In studying the simplest sort of dreams—namely, those of infants, a large number of which Freud has made use of, it can be seen that they have largely to do with the fulfilment of wishes, and that furthermore such wish fulfilments are immediate in origin, frequently of the day before or with desires that have been part of the preceding day's experiences. A further variation of such dreams is the condition of the wish fulfilment already accomplished. The dream partakes then of the sensations and experiences which can be associated with a state of completion in the light of such a wish or desire.

In the attempt to explain how the wish fulfilment can be connected with dreams that are unpleasant and undesirable, Freud gives what appears to be a somewhat far-fetched explanation; in fact, explanation that strains one's credulity to some extent. The transposition of what on the surface appears unpleasant to something which is the opposite

comes about by what can be described as an imaginative *tour de force*, or extreme ingenuity. The individual appears in the dream in the guise of someone else, and in this sense the wish motive, as it were, is fulfilled. Examples of this kind of thing are given in great abundance in the "Traumdeutung." Dreams belonging to the third category show by their analyses to be much richer in material than the dream content leads one to believe; therefore, dreams have the power of enormously condensing the material. By means of the power of condensation (*Verdichtungs Arbeit*), many of the curious ideas in a dream may be explained. The figures are made up of component parts of several individuals, animals of no recognizable types. The terrifying and unnatural beasts and figures are composite pictures which in the condensation process appear for the instant as one.

Every element of the dream content is by means of the dream thought over-determined, and owes its origin not to one element but to many.

These do not stand in approximation in the dream thought, but belong to the most widely-separated circles of the thought fabric. The dream elements in the true sense are representative in the dream content of all of those materials, no matter how distant they are from each other.

Of great importance in understanding confused dreams is the element of displacement (*Traum Verschiebung*) or the undervaluation of the psychical worth of a dream event. In analyzing a dream, therefore, it is essential to appreciate that the facts of a dream do not necessarily give a measurement of their psychic value, for upon analysis the seemingly unimportant events lead really and very directly to vital latent elements. It can be seen perhaps from such brief abstracts that Freud is attempting to use the rich and varied mass of psychic stuff found in dreams to broaden out his material for psycho-analysis in the neuroses. He finds much the same kind of mechanism at work in the one set as in the other. In truth, he says, that dream work (*Traum Arbeit*) is merely the first recognizable among a series of psychical processes upon which rests the origin of hysterical symptoms, anxiety, imperative and delusional ideas. Condensations and replacements are never failing characteristics of these other processes.

One of the most important activities in dream work is the process by which dream thoughts of an unpleasant or strange kind are prevented from entering consciousness. This process is termed by Freud *verdrangung* or supplantation. The formula is therefore advanced that the dream is the disguised fulfilment of a supposed or supplanted wish. This process is further elaborated in this way. It is assumed that in our psychical apparatus there are two thought forming organizations, the second of which seems to be the more active and powerful in that its products find an easy entrance into consciousness. The activities of the second organization partake of the unconscious and only reach consciousness over the second. At the borderland of both organizations at the place where their outposts meet, as it were, there is found a censor, the duties

of which are to shove out and hold back from consciousness everything that is unpleasant and strange and to admit into consciousness only that which is pleasant. That which is sent back by the censor is in a condition of *verdrangung* or supplantation. Under certain conditions of which sleep may be one, the relative strength of these two organizations changes, so that the supplanted ideas cannot be altogether held back. In sleep this comes about because the censor is, as it were, unmindful at his post, so that the supplanted ideas, formerly shoved back into the unconsciousness, succeed in reaching consciousness; not, however, in their original strength, nor yet altogether colorless, for the censor is still somewhat active, but in a state of lessened vigor and lessened definiteness; in other words, in a condition which Freud calls a compromise. The process then is *verdrangung*, neglect of the censor compromise effect.

Apart from the psychological interest which must always attach to attempts in explaining dream phenomena, our chief concern is to discover in the *Traumdeutung* a necessary connection both in its theoretical side and in the practical carrying out of the psycho-analytical procedure.

It is to be remembered that in Freud's book on "*Traumdeutung*" a large part is devoted to the relation of actual dreams and their analyses. A great deal of this is necessarily tedious and difficult to follow, and a large part must likewise be regarded as unconvincing. This is due perhaps to its extreme novelty and to the use of a terminology that has no place in our present psychological literature.

Two features, however, stand out with some emphasis. There is the discovery of a mass of psychological material derived from the dream analysis, which cannot fail to be of importance on account of the insight it furnishes into the intimate soul activity of the neurotic patient; and there is the connecting link between the origin of psychoneurotic symptom and the origin of a dream material, in both instances sexual in character.

The theory of the psychoneuroses asserts with absolute certainty that only sexually-originating wishes can arise in the infantile period. In the developmental period of childhood, these experience the process of supplantation, and later in pubescence are capable of revivification; thus is given the energy for the development of all symptomatic structures. In the early edition of "*Traumdeutung*," Freud leaves unanswered the question whether the dream theory rests upon some kind of originating sources in its casual relation as do the neuroses. In the second edition of "*Traumdeutung*" Freud answers this question as follows: "The more one is concerned with the solution of dreams the more one must admit that the majority of dreams have to do with sexual material which brings into active expression wishes of an erotic nature."

The difficulty in interpretation lies often in the seemingly abrupt ending to which our analysis leads. To all intents and purposes, the dream lies perfectly clear before us in respect to its narrative events, and becomes to most of us a fully-interpreted dream: this for Freud is the most

superficial explanation. To go beyond this it is necessary to make use of dream symbols and their curious and most unexpected meanings. To understand them, it is essential to acquire a mass of facts derived from folk-lore, mythology, historical and pre-historical traditions, which to most of us is apparently an impossible task. What is left can be largely stated in this way: If in any of the confused dreams our analysis does not lead us back to its sexual origin, then our analysis is necessarily incomplete and superficial and so we are forced to let the matter rest.

I am aware of the inadequacy of this presentation of *Traumdeutung*; but if I have succeeded in supplying some kind of connection between the facts discovered in the analysis of dreams and facts that appear as established in the symptoms of neuroses, I shall have succeeded in creating some kind of unity which at least gives the Freudism concept a sort of hanging together quality which, upon first sight, it does not possess.

The value of the Freudism philosophy to the neurologist, I suppose, depends largely on the personal experience of the one who happens to be trying the method out. As a therapeutic measure it has without doubt won for itself a place which cannot be denied. I know of nothing in my own experience which has seemed to me quite as valuable as the psycho-analysis of laying bare to the neurological eye, the fabric of a patient's intimate psychical life.

The effect upon the patient is less easy to determine. How far the educational effect will extend, and how nearly it will restore the victim of a neurosis to a normal being, are things that cannot be answered at the present time. By what standards are we to measure the curativeness of a method as intricate as this, and further by what standards are we to measure a patient in respect to his state of being cured. Neither Freud nor his students have concerned themselves with questions of this kind nor, perhaps, do they see the necessity of attempting to do so.

There remains then this fact, and it is a stubborn fact. Almost everyone who has used the Freudian methods, after careful preparation, has been so impressed by its main truths that he has continued its further use, and the larger his experience grows, the more evidence he finds of the correctness of the Freudian assertions in general and the less incongruous and strange do the majority of them appear. This has been about my own experience, in one I might add, to whom Freud's work has up to within a fairly recent time been of vital theoretical interest, but singularly impracticable as a therapeutic application.

Perhaps what is of value in the Freudian psychology is that indefinite part of it, which happens to be true, and this part is a large or small proportion of the whole depending upon the insight of him who happens to be the analyst. At any rate it seems fair toward such a vexatious question to take a kind of pragmatic attitude. Let us assume that such part of the Freudian scheme is true which happens to be of use, and proceed further in the assurance that its utility tends to increase with its further application.

MEDICAL AND SURGICAL PROGRESS.

EHRLICH'S "606."

A REVIEW OF THE LITERATURE SINCE JANUARY, 1911.

By WM. ENGELBACH, M. D., of the Editorial Staff.

1. Abelin: Directions in Regard to a Method for Injecting Salvarsan. (*Muench. Med. Wochenschr.*, No. 19, p. 1002, 1911.)
2. Alston: Curative Effect of Salvarsan in Framboesia. (*Brit. Med. Journ.*, p. 618, March 18th, 1911.)
3. Balfour: The Effect of Salvarsan on *Treponema Pallidum*. (*Brit. Med. Journ.*, p. 1174, May 20th, 1911.)
4. Bayley: The Intravenous Method of Treatment of Syphilis with Salvarsan ("606"), with a Convenient Apparatus for such Administration. (*Lancet*, p. 153, January 21st, 1911.)
5. Beisele: Directions in Regard to a New Method for Injecting Salvarsan. (*Muench. med. Wochenschr.*, No. 24, p. 1313, 1911.)
6. Bernard: Salvarsan ("606") and Mercury in the Treatment of Syphilis. (*Lancet*, p. 253, July 22nd, 1911.)
7. Blayney and Dempsey: Experiences with "606" in Syphilis. (Report to Royal Academy of Medicine in Ireland, May 26th, 1911.)
8. Czerny and Caan: Experiences with Salvarsan in Malignant Tumors. (*Muench. med. Wochenschr.*, No. 17, p. 881, April 25th, 1911.)
9. Desneux and Dujardin: Nerve Lesions after Treatment of Syphilis with Salvarsan. (*Deutsch. med. Wochenschr.*, No. 23, p. 1245, 1911.)
10. Evans: The Treatment of Syphilis by Salvarsan (dioxy-diamido-arseno-benzol). (*Brit. Med. Journ.*, p. 617, March 18th, 1911.)
11. Fleming and Colebrook: On the Use of Salvarsan in the Treatment of Syphilis. (*Lancet*, p. 1631, June 17th, 1911.)
12. French: Salvarsan ("606") and Mercury in the Treatment of Syphilis. (*Lancet*, p. 1691, June 24th, 1911.)
13. Gerber: The Effect of Salvarsan on Syphilis of the Upper Air-Passages, Scleroma, Plaut-Vincent's Angina, and Scorbutus. (*Arch. fuer Laryngol. u. Rhinol.*, Band 3, p. 266, 1911.)
14. Goldenberg and Kaliski: Salvarsan. (*Amer. Journ. Med. Sciences*, March and April, 1911.)
15. Hallopeau: Hectine and Salvarsan in the Treatment of Syphilis. (*Académie de Médecine*, July 11th, 1911.)
16. Jesionek: Salvarsan Milk. (*Muench. med. Wochenschr.*, No. 22, 1911.)

17. Marshall: Remarks on the Treatment of Syphilis with Dioxy-diamido-arseno-benzol ("606"). (*Lancet*, p. 501, February 25th, 1911.)
18. Martius: Deaths Resulting after Injection of Salvarsan in Diseases of Heart and Blood-Vessels. (*Muench. med. Wochenschr.*, No. 20, p. 1067, 1911.)
19. Mayerhofer: On the Favorable Therapeutic Influence of Salvarsan in a Chronic Case of Chorea Minor in a Child. (*Wien. klin. Wochenschr.*, No. 27, p. 976, 1911.)
20. McIntosh and Fildes: "606" and Syphilis. (*Lancet*, p. 724, March 18th, 1911.)
21. Montesanto: The Influence of Salvarsan on the Bacillus Leprae. (*Muench. med. Wochenschr.*, No. 10, p. 511, March 7th, 1911.)
22. Mucha: Salvarsan Treatment of Syphilis. (*Wien. klin. Wochenschr.*, No. 27, p. 963, 1911.)
23. Neuhaus: Experiences with Salvarsan in Syphilis of the Central Nervous System. (*Muench. med. Wochenschr.*, No. 18, p. 955, 1911.)
24. Ploeger: Remarks on the Technique of the Intravenous Injection of Salvarsan. (*Muench. med. Wochenschr.*, No. 20, p. 1071, 1911.)
25. Rost: Salvarsan in Framboesia, Leprosy and Granuloma Tropicum. (*Muench. med. Wochenschr.*, No. 21, p. 1136, 1911.)
26. Stokar: Salvarsan Treatment by the General Practitioner. (*Muench. med. Wochenschr.*, No. 24, p. 1305, 1911.)
27. Stuelp: Experiences with Salvarsan in Syphilis of the Eye from Literature and Personal Observations. From the Eye-Clinic of Dr. Stuelp at Muehlheim. (*Klin. Monatschr. fuer Augenheilk.*, No. 49, p. 369, March, 1911.)
28. Taylor and Mackenna: Salvarsan in the Treatment of Syphilis. (*Lancet*, p. 1412, May 27th, 1911.)
29. Wechselmann: New Experiences with the Intravenous Injection of Salvarsan without Untoward Occurrences. (*Muench. med. Wochenschr.*, No. 28, p. 1510, 1911.)

A classification of the literature published on the subject of salvarsan since January 1st, 1911, impresses one with the fact that a review limited only to the important articles would be too extensive and contain too much of repetition for the space assigned to this department. For this reason, this review does not include the American literature upon the subject, or abstracts of those articles which have appeared in other departments of this JOURNAL, but contains the less accessible foreign literature which was deemed reliable and authoritative and which represented the most recent developments concerning salvarsan. The subject-matter has been arranged in groups dealing with the peculiar organo-chemical reactions, the newer technique, well-considered criticisms concerning its value, the general use of the drug, the effect of salvarsan upon general specific infections, its effect upon local specific lesions of special systems,—nervous and circulatory, and special sense organs as the eye, and its effect upon other diseases,—Vincent's angina, chorea, etc.

The many recurrences and relapses and untoward effects, both local and general, which have occurred in almost every investigator's experience after the use of salvarsan, have already disqualified the absolute specific and uninjurious actions of this drug, reports of which dominated the

earlier literature upon this subject. Notwithstanding these results, the accumulation of evidence which is presented by an analysis of all the literature to date, already proves that salvarsan is probably the one most potent remedy which can be directed towards retarding,—but not absolutely ending, the activity of the spirochæta infection. That one dose of this remedy will not cure human syphilis is probably now beyond question. That a salvarsan cure or salvarsan combined with other treatment, given with proper technique, under correct indications, seems to be the most adequate means of treating this disease is the consensus of opinion deduced from these investigations. This drug should be considered then more in the light of a valuable remedy which will act as an adjunct or a temporary substitute to the already well-known therapy of this disease.

Abelin presents a new method of testing the presence of salvarsan in fluids, especially in the urine. He obtained a characteristic color-reaction by applying the Ehrlich diazo-reagent. Five or six drops of diluted hydrochloric acid are added to seven or eight c. mm. of urine, the solution is cooled and three or four drops of a 0.5 per cent. solution of sodium nitrate added. If a few drops of this solution is added to five or six c. mm. of the colorless alkaline resorcin solution, a distinctly red color reaction is gotten. If this mixture stands for a time, a dark zone forms at the top. Urine free of salvarsan thus tested gives a yellowish color reaction. It is imperative that the solution be alkaline, as free acid checks the color reaction. Abelin found salvarsan present in urine as early as two hours after its injection.

Beisele takes exception to Abelin's statement that a specific diazo-reaction for salvarsan can be found in the urine of a patient who has been submitted to an injection of "606." Abelin describes the color of the reaction as reddish-brown. Beisele holds that the salvarsan undergoes transformation in the body, and that Abelin must have been mistaken in his analysis. He furthermore states that the color for the salvarsan reaction should be cherry-red; a brown color can be obtained with the Ehrlich reagent in all urine. The dark zone which forms after the solution stands for some time is due to oxidation, which takes place in most phenols in alkaline solution.

In the course of 4,500 injections of salvarsan—2,500 subcutaneously and 2,000 intravenously—Wechselmann denies encountering any toxic effects. He explains the instances where such mishaps have been met as due to faulty technique, and emphasizes his statement by the following instance: A preparation of the drug was returned to Ehrlich by a Berlin apothecary to be tested, since it had occasioned several fatalities. The drug was tested on animals and found to be ideal. Thereupon Ehrlich requested Wechselmann to use it on one of his patients. It was employed and absolutely no unpleasant reaction met. Wechselmann feels that many fatalities are due to careless asepsis and recommends careful sterilization of the distilled water. Of course, some patients are super-sensitive, and more care is required. Patients with syphilitic aortitis and other cardiac complications must be closely watched. Though Wechselmann has treated many patients having cardiac affections, he has not had a fatality.

An apparatus which Ploeger has invented for intravenous injections has been used by him with great success in over 200 cases. He claims for it that it combines the merits of the syringe- and funnel-methods and that in it a simple needle may be used which is steadily guided during its introduction and firmly held during the entire infusion. Oozing blood,

which warns of an incorrect position of the needle, nevertheless does not blur the operating field. The salt or salvarsan solution is always directly behind the needle, and its warmth and solubility can be easily controlled. No air or splinters of glass can penetrate into the wound. In contrast to other instruments, Ploeger claims that his may be used without an assistant by those little experienced in intravenous technique, even in difficult cases requiring several punctures.

Taylor and MacKenna recommend the intravenous method as far more satisfactory, in comparison to the intramuscular, in "striking a sudden and powerful blow at the micro-organism of the disease." This method is also for the most part painless. The solution is carried by the blood-stream throughout the body, and the lethal effect upon the spirochætæ is immediate. The vein chosen for the injection should be either the median cephalic or the median basilic. The greatest care must be taken to ascertain that the lumen of the vein has been punctured. The sense of touch, the appearance of the blood at the little glass window in the tube, the absence of swelling over the vein when the container is elevated and the normal saline solution is introduced, are facts which attest to a correct puncture. During the injection, the patient often complains of a sensation of pins and needles all over the body or in the arm operated, or he may have a feeling of fullness in the head. These symptoms may be relieved by lessening the rate of flow. Nausea, vomiting or diarrhea, rigor and rise of temperature are also, at times, concomitant results of the injection. The more acute the infection, the more marked the reaction; for then immediate destruction of the spirochætæ takes place, and the liberation of the endotoxins which flood the system gives rise to these systemic disturbances. All unpleasant results are, however, soon relieved, and after the sixth day, no trace of arsenic can be found in the urine. Nevertheless, recovery keeps on, due perhaps to the antibodies produced. Lesions of the mucosa, especially of the upper air-tract, are most amenable to treatment, the relief often being miraculously quick. Chancres disappear in eight to fourteen days, and a papular rash clears up in about ten days. In parasyphilitic conditions, due to active inflammatory processes and not to actual sclerotic degeneration, "606" will also prove effective. It cannot restore nerve tissues which have undergone sclerotic changes. The authors point out that the relapses which have occurred—in about 25 per cent. of the cases—have been due in part to the small doses which were at first administered, and the fatalities—often in infants—have resulted from faulty technique. All the cases treated by them have responded remarkably well, without disasters or accidents. They advise, in conclusion, that salvarsan should be intravenously administered to every fresh case of syphilis and a second dose given if the Wassermann reaction is still positive after a week. It may be well to follow up stubborn cases by administering later mercury or the iodides, so that any arsenic-resisting spirochætæ which may form may be destroyed.

Blayney and Dempsey reported their experiences with "606" to the Royal Academy of Medicine in Ireland, and the steps that led to its use. The intravenous method was found to be the preferable one and a cure was effected in nine of ten cases treated. The unsuccessfully treated case was one of tertiary infiltration of the larynx. After an interval of five or six days, a second injection is strongly recommended in all cases.

Fleming and Colebrook's experiences with salvarsan cover a period of nine months. They abandoned the intramuscular method upon the recom-

mendation of Ehrlich, and found the intravenous one less painful, quicker, and resulting in fewer relapses. The apparatus used by them is similar to one described by Schreiber about a year ago. It consists of a syringe connected by a three or four-way tap to a needle and to the receptacles for the two solutions. Fleming and Colebrook have made several modifications and additions to this instrument to meet the needs of the operations. The vein best suited for the operation is one of those at the bend of the elbow. To avoid lacerating the walls of the vein, they pass a piece of strapping around the arm and the butt of the needle. The patient should be kept in bed for about thirty-six hours, or at least for twenty-four hours after the temperature becomes normal. Often following the intravenous injection there is a throbbing and feeling of fullness in the head, chills, rise in temperature, etc. But these symptoms subside in twenty-four hours. In only one case which had been intramuscularly injected was there persistent high fever for a week. Many of the cases injected by them had been under mercurial treatment without improvement. One case which had been submitted to an injection of 0.7 gm., showed rapid improvement in the original scalp ulcer, but a few days later a node appeared on the forehead which moved to various portions of the body. After a second intramuscular dose, the lesions still persisted, but a third intravenous injection effected a complete cure. In a case of ulceration of the nasal septum, the first injection (0.5 gm.) even aggravated the process. However, after a second intravenous injection the ulceration was arrested. The effect on the Wassermann reaction was variable and Fleming and Colebrook refrain from arriving at a conclusion as to their relation.

Bayley has found the intravenous method the preferable one for making salvarsan injections, and has devised an instrument which he claims facilitates the process, especially in so far that it prevents the needle from lacerating the vein while the operator manipulates the taps and plunger. His apparatus consists of a container surrounded by a hot-water jacket, a rubber tube about four feet long connecting the container and needle-holder, and a stout needle, one and a quarter inches long. Three inches from the needle-holder a piece of glass tubing is inserted to act as a window, by means of which the oozing blood may be seen, and which determines whether the needle is inserted in the vein. The flow is regulated by altering the height of the container and by a clip applied to the rubber tube about a foot from the needle-holder. The salvarsan must be injected slowly. It is wise to pour about 100 c.c. of normal saline solution into the irrigator just before the salvarsan has run out, so that the needle may be washed free of "606" before withdrawing; for if any of the solution escapes along the needle track, some local irritation may arise. If the patient be given a thorough physic the night before the injection and little food or drink hours before the operation, no alarming symptoms will become manifest. The temperature generally rises a few hours after the infusion, but usually becomes normal within twenty-four hours. The arsenic is almost entirely eliminated within a week, so that a second dose may be given within a fortnight. The patient should be kept in bed for twenty-four hours after the temperature becomes normal.

Balfour has examined by the dark-field method a preparation of serous fluid obtained from a patient four hours after the injection of "606," by scraping the surface of a buccal mucous tubercle which had previously shown the presence of *treponema pallidum*. At first only motile, highly refractile granules were found. Later, however, *treponema pallidum* became apparent, actively shedding granules. It seems that this granule-

shedding process of organisms, doubtlessly resistant, is an act on the part of the spirochætæ to protect themselves from total extinction. These granule-bodies are probably similar to spores. This observation has much bearing on the course of treatment. Several experimenters have found that an immediate second dose of salvarsan has a very good influence upon arresting the course of the disease. Balfour concludes that this second dose kills the resisting granules which have been shed, and prevents a recurrence due to storing up of the infection.

Jesionek followed the plan of Teage and Duhot in treating congenitally-syphilitic infants by injecting the mother with salvarsan, but does not report the satisfactory results recorded by them. Contrary to the views of these men, he found arsenic present in the milk of women in whom this injection had been made. In both his cases, on the day following the injection of the mother, eruptions developed in the infant. These eruptions were apparently neither toxic, nor an arsenic eczema, nor a Herxheimer reaction. Were it not known that extensive virus is present in a congenitally-syphilitic infant, one might have supposed that the reaction resulted from a flooding of the virus. Jesionek concludes that through the milk of injected syphilitic mothers, there passes into the organism of the child an arsenic combination which can produce, qualitatively or quantitatively, toxic curative changes in the new-born: antibodies or endotoxins. These elements arouse the already present spirochætæ to, or capacitate them for, a pathological activity.

In one case he fed a syphilitic child of five years upon milk from a goat into which salvarsan had been injected, and obtained such good results that he feels warranted in recommending this method. An ideal way would be to inject an uninfected wet-nurse, but since this is rarely possible the child should be fed on milk from a cow or goat into which "606" has been previously injected. He points out that the milk of a syphilitic woman cannot be as wholesome, even though it contains antibodies, as salvarsanized milk free from these toxic syphilitic elements. He urges the infected woman to refrain from nursing her child at least during the first few days following injection, as long as there is any suspicion of endotoxins in her organism.

Stokar has found the subcutaneous and intramuscular methods of injection far less satisfactory than the intravenous, and recommends the latter. He advised those unfamiliar with the technique of intravenous injections to practise vein-tapping as is done for the Wassermann test. Skill can only be acquired by experience. Because of the initial difficulties Stokar advises beginners to expose the vein—a simple and almost painless process. Otherwise, especially in fat people whose veins are well embedded, various difficulties are met,—the vein is not at all punctured, or it is punctured through, etc. If the infusion is quite uncomplicated, the patient has little pain, nor are there any local reactions. Local thromboses can be prevented by avoiding getting any salvarsan around the vein. Stokar always makes a trial-injection of 0.1 gm. salvarsan in all patients showing symptoms of cardiovascular affection or affections of the nervous system. If this is well tolerated, he makes a second injection after four or five days. He has made over 700 intravenous injections; some of the patients being luetics with serious heart and nervous diseases, and in no case has he had serious complications. The duration of the treatment should be intermittent for three or four years. Neisser advises that it be continued until all syphilitic symptoms disappear permanently and a permanent Wassermann reaction is obtained. Just what

the prognostic and therapeutic values of the Wassermann reaction may be, he is not prepared to say. Salvarsan has not simplified the treatment of syphilis. On the contrary, it has complicated it. But it has introduced a far more effective weapon for fighting it, and one by which its spread may be arrested in the initial stages.

In order to study the effect of salvarsan upon cardiovascular disease, Martius has analyzed all the cases on record, including those occurring in the Senckenberg Pathological Institute, and those about which Ehrlich has been personally informed. He reviews all fatalities: three of which occurred in his own practice, seven obtained from the literature, and eight hitherto unpublished cases. If the heart is sound, Martius feels that salvarsan may be safely administered, even intravenously, provided the dose is small (0.3 grm.), greatly diluted, and given slowly. However, great care must be taken that an acid reaction is not obtained. In only seven of all the known fatalities, resulting from the use of the drug, is there any question of the injurious effect of salvarsan upon the heart. In five of these seven fatalities, post-mortem revealed the triad: Syphilitic aortitis, coronary sclerosis, and myocarditis complicating myodegeneration of the heart. One case merely revealed hypoplasia of the heart and aorta, and in another case, in which the patient died in coma, extensive changes in other organs were found which easily explained the fatal termination apart from the effect of the drug. In four of these seven cases, no objective changes in the heart or vessels had been clinically apparent, and in only one was there a subjective symptom. Martius concludes that the triad: syphilitic aortitis, coronary sclerosis, and myocarditis are a positive, definite contraindication against the use of salvarsan. However, it is very difficult to arrive at conclusions, as is shown by the instances where death occurred just before the administration of the dose. Had the patients lived a little longer, salvarsan would have been given and then held responsible for the fatality. In cases of angina pectoris, where the heart and its muscles are intact, numerous instances prove the absolutely favorable effect of the drug.

Marshall decries the enthusiasm with which the medical world has and is responding to salvarsan. He feels that "606" can in no manner replace mercury or the iodides; that it is in fact a rather useless addition. Before any drug can be regarded as a substitute for the iodides or mercury, it must be proved capable of (1) aborting the disease; (2) preventing tertiary or parasyphilitic manifestations; (3) healing the lesions more quickly, constantly and permanently; and (4) causing fewer dangerous toxic effects. The first of these requirements cannot be proved for it or any drug, owing to the long latent periods that may elapse between the early and late manifestations of the infection. As to the second point, Marshall admits that the drug is too new to draw conclusions, but that mercury has been found to have this influence. He explains the fact that scientists heralded the results of salvarsan therapy as "marvelous," "miraculous," etc., as due to lack of "level-headedness." They forgot that mercury has the same rapid effect. Then, too, their enthusiasm was aroused before the relapses occurred. Recently, however, these recurrences have been frequent after the average dose (0.6 grm.). Marshall denies that "606" has a value as a substitute drug; for the cases where mercury or the iodides fail, are instances in which the doses of these drugs have not been administered properly. If the individual needs are studied, this medication suffices. Lastly, the intravenous method is extremely dangerous and several fatalities may be traced to this cause. The

deaths that have resulted from mercurial treatment have been due, not to the drug, but to the method of administration. After weighing the pros and cons, Marshall concludes that "606" in its present form cannot supplant the older therapy, and that it would have been better for the profession and for the public if its use had been greater restricted.

McIntosh and Fildes take issue with Marshall for his statement that the results with salvarsan therapy have been unsatisfactory and that the drug cannot in any wise be considered as a substitute for the iodides or mercury. In the course of their eight months' experience with "606" in the London Hospital, where all but one of the patients submitted to the injection have been under continuous observation, quite the contrary has been found true. With the exception of one case of interstitial keratitis and three in which secondary pathological complications were found, good results were obtained. Relapses have occurred, but they have resulted from insufficient doses. Marshall errs in supposing that 0.6 gm. is an average dose. Ehrlich himself recommends increasing the amount until 1.0 to 1.4 gm. have been given. Of course, this quantity is administered in fractional parts at intervals, covering several days. Unless the patient receives this amount, relapse may occur. The fatalities reported in cases of general paralysis, organic heart disease, or vascular degeneration, have been due not so much to the drug itself, as to an improper use of it. The blindness which occurs has no direct connection with the medication. Such cases are pure relapses, syphilitic iritis or retinitis, and do not occur oftener than in mercury treatment. McIntosh and Fildes feel that "606" is far superior to mercury in the symptomatic treatment of syphilis and in arresting the development of the infection.

French belongs to those who feel that the support which salvarsan therapy is obtaining in the medical world is somewhat misplaced. He admits that it is of some value in the later stages of syphilis, but that in early syphilis it is not an actual curative agent like mercury. He quotes Kalberstaedter and others as saying that though salvarsan is an excellent remedy, the extravagant statements regarding its curative powers are unjustifiable, since relapses occur so frequently. French believes mercury should only be supplanted by "606" in those cases of advanced syphilis where mercury is positively contraindicated. In other cases, mercurial medication, if properly administered, will be found to suffice. The usual mistake lies in not giving a sufficiently intensive course of mercury in a suitable form in the early primary stage or in administering it too profusely in the later anemic, debilitated, or malarial stages. Most of the cures recorded as due to "606," French feels, would have been more rapidly effected by the use of mercury or potassium iodide, which would have been a far more potent factor in preventing relapses and tertiary manifestations. The number of casualties due to salvarsan—fourteen deaths in infants and seventeen in adults—seems to him also to warn of the danger of the drug. Some authors advise a combined use of "606" and mercury, but French objects that if it has value it must effect results alone. The influence of this drug upon the Wassermann reaction, too, has been so variable thus far, that this reaction has been of little use in directing the treatment. French concludes that salvarsan is far inferior to mercury and will never supplant it. In most cases of syphilis, it should not be used in place of mercury within the first six months from the date of contagion. In the course of his discussion, French severely criticizes Ehrlich's manner of "admixing commercialism with scientific medical research," and of putting the drug on the market at the forbidding price of 10 s. for a dose of 0.6 gm.

Hallopeau states that the employment of salvarsan ought to be reserved for those periods in syphilis when the disease becomes general. Hectine, employed locally by injections, is preferred by him because it is effective in the primary lesion. Its abortive effect on the disease itself is accomplished if a sufficient number of injections is made, and these, moreover, should be made as near as possible to the initial induration. If this is done, it is said that there will be a great diminution in the frequency of this infection.

Thus far Mucha has used the salvarsan therapy in 528 cases, in some of whom the dose was repeated; in one case, four times. Of his 528 cases, 150 (28 per cent.) did not again return for treatment. 102 of this total were in the primary stage (86 men and 16 women). 322, in the secondary stage (180 men and 142 women); and in the tertiary stage, there were 56 (33 men and 23 women). Most of the later injections were made intravenously, since personal and other experience pointed to this method. After the subcutaneous injection, a necrosis often arises which persists for several months, and when the intramuscular method is employed necrosis arises in the tissues which come into direct contact with the drug, and traces of arsenic persist for months in the urine. For the injection, Mucha uses a modification of the Weintraud apparatus. The average dose for healthy adults is 0.4 grm. Whether permanent cures resulted in any of the cases, it is now too early to judge; relapses have occurred almost as frequently as under mercurial medication. In only one case were there any serious complications following the intravenous method. In this one case, that of a woman whose physical examination showed nothing abnormal, the patient suddenly became cyanosed and respiration became difficult. These symptoms were much relieved as soon as the injection ceased. Local disturbances arose in three instances where some of the fluid came in contact with the tissues around the vein. In two patients suffering from syphilis maligna, thromboses occurred, though the injection area showed no clinical changes. All his experiences prove that the intravenous method is far superior to the others and that it is far more pleasant for the patient. By this method, too, arsenic is absorbed more quickly.

Evans records his experiences in 44 cases in which the Ehrlich-Hata remedy was applied. These cases include simple chancre, chancres plus early secondary manifestations, secondary lesions, and eleven tertiary lesions. Thirty-four of these patients were submitted to the intramuscular method, while the others were intravenously injected. The results were uniformly good. The primary lesions disappeared in all the cases before the fourteenth day, usually earlier; secondary lesions also improved rapidly; and the tertiary cases, gummatous ulcerations of the skin, lesions of the buccal mucosa, etc., healed satisfactorily. In only one case—perforation of the hard palate with necrosis extending to the nasal septum—was the result less promising. The necrosis persisted and a second injection was made. In many of the cases treated, the iodides and mercury had been ineffectively employed. Evans has found that the intravenous method produces the more rapid cure in the primary and secondary stages, while in the tertiary stage, the results from the intramuscular are as prompt as from the intravenous. For men he used 0.4 grm., and 0.3 grm. for women. Though the condition of the patient immediately following the injection was often serious, all these symptoms cleared up within twenty-four hours.

Bernard recounts the experiences with "606" in the Liverpool Royal

Infirmaries where 40 cases were treated within the last five months. The cases present the three stages, some being twelve-year-old infections. The rapidity with which mucous lesions yielded was "a revelation," a satisfactory result being obtained within a week. At first the intramuscular method was used, but later the intravenous was found to be more satisfactory. The median basilic was found to be the most convenient vein for the injection. In a neurotic patient showing atoxic symptoms, who had been under mercurial treatment without much success, an injection was made. Within ten days, much improvement was noted, and his gait became steadier. In none of the cases was there unpleasant reaction for any length of time.

Goldenberg and Kaliski used "606" on forty-eight patients. They found that manifest symptoms yielded within a week or two, lymphadenitis was slowly and only partially relieved, macular and pustular secondary cutaneous syphilides were more quickly influenced than papular eruptions. Wonderfully rapid results were obtained in lesions of the mucous membrane and moist condylomata. Circinate squamous syphilides reacted promptly, while gummata responded slower. Ulcers, periostitis and iritis cleared up in two to four weeks, while the effect upon cerebrospinal syphilis was immediate. In all but one case, the intramuscular method was used (0.45 to 0.6 gm. for women and 0.5 to 0.7 gm. for men). In some instances, the injection was repeated. Five relapses occurred. The authors conclude that unless there are positive contraindications, salvarsan should be administered in cases of syphilis, especially where there is malignancy—intolerance of mercury or serious gummata.

Neuhaus administered salvarsan, usually intramuscularly, in 17 cases of syphilitic and parasyphilitic affections of the nervous system which came under his observation. The cases were thus distributed: Tertiary cerebrospinal lues 7; subacute luetic (?); poliomyelitis 1; tabes 5; paralysis 2; hepar lobatum 1; and luetic (?) cirrhosis of the liver 1. He encountered no prolonged unfavorable results, though the immediate effect was often a rise in temperature and more or less severe pains at the point of injection. The latter were relieved through morphine and hot baths. Apropos of a fatality after the administration of salvarsan, for which a pyelonephritic condition was alone responsible, Neuhaus points out the difficulty of definitely determining that a death resulted from the use of the drug. He cites the following case: A woman was admitted to the hospital in an unconscious state, with exophthalmos and choked disc. Syphilis was surmised and a Wassermann test made, but before the results were determined, the patient died. The reaction was positive. The cause of the trouble, however, proved to be a tumor of the hypophysis. Had the results of the test become known before the death of the woman, salvarsan would have been administered and the fatal termination attributed to it. Neuhaus also points out that this case shows that a positive Wassermann reaction is not in itself a definite indication for specific treatment. During the course of his review he cites instances in which the Wassermann reaction remained unchanged even after the patient was dismissed from treatment, and states that salvarsan has little effect upon the test, and that it cannot be used as a guide in the treatment. In regard to repetition of the doses, the author states that his most successful results were obtained by injections at intervals of about four weeks. In one case, five injections of 0.3 to 0.5 gm. doses were made into the gluteal muscles and in the back, at intervals of about a month. Just how often the drug should be given, the future alone can determine.

It must be noted that salvarsan has both an immediate and delayed effect. Disturbances in speech due to apoplexy, pains, etc. are relieved after a few days; while the use of paralyzed portions of the body and the pupillary reactions are only restored three or four weeks after the administration of the dose.

Desneux and Dujardin report their experiences of neuro-recurrences, after the use of salvarsan, encountered in only six of a total of 350 cases treated. They feel that the reaction is not purely toxic. It often develops three or four months after the injection, and is very likely of a syphilitic nature. The severe headaches which appeared in all the cases, and the fact that the nerves affected were those lying nearest to the base of the brain, lead them to suspect a localized syphilitic meningitis. They call attention to the two phases in the treatment of syphilis. After an injection of less than 1 grm. the external symptoms disappear; but before the Wassermann reaction is permanently influenced, 2 grm. or more must be given. This amount is not often injected, for the reason that the fear of over-doses still exists, and also because the patient quits treatment as soon as the external signs are relieved. An insufficient dose does not arrest the development of the spirochætæ, but on the contrary seems to have a peculiar effect in shaping the direction.

Stuelp gives a splendid synopsis of literature, comprising one hundred and twenty articles, out of about two hundred and fifty original contributions, and about as many addresses and discussions on experiences in regard to the action of the Ehrlich-Hata "606" obtained from about 40,000 injections, with regard to the following points:—

1. What has the remedy so far achieved in syphilitic eye-diseases, and which indications concern the ophthalmologist?
2. For which accidental effects must we eventually be prepared?
3. Which contraindications have been ascertained so far?
4. Which method of application is the most suitable for the given case?

Up to February, 1911, Stuelp collected from literature 470 eye-cases which are arranged in anatomical order, followed by the brief clinical histories of 4 eye-cases and one of (luetie) albuminuria of his own. This showed no result. In a case of relapsing blepharitis and scrofulous (or luetic?) keratitis in a girl, affected with hereditary lues, the result was fair. In a case of optic neuritis and chorioretinitis of the macular region, there was at first improvement but afterwards a relapse set in. A woman, aged fifty, infected twenty-five years previously, was blind in right eye from an old neuro-retinochorioiditis, and had now the same recent affection of the left eye with V.=6/24, which, although treated with mercury and iodide, relapsed several times with iridocyclitic symptoms, headache, asomnia, slight paralysis of facial nerve, and forebodings of general paresis. Salvarsan effected, after a week, prompt general success with V.=I. The fifth case, a man aged twenty-eight, had a most severe parenchymatous keratitis, cornea white as porcelain, with slight cyclitic injection, V. reduced to perception of light. Two weeks after an injection of salvarsan, the cornea showed a decided clearing and the patient counted fingers nearby. The results of a single injection of salvarsan in the above mentioned 470 eye-cases were:—

	Prompt Result. Favorable Influence.	No Results Respectively, Relapses.
(a) In Syphilitic Affections of the Eyelids.	100 per cent.	—
(b) In Syphilitic Affections of the Conjunctiva.	63 per cent.	37
(c) In Syphilitic Affections of the Cornea (parenchy- matous keratitis).	28 per cent.	72
(d) In Syphilitic Affections of the Sclera.	80 per cent.	20
(e) In Syphilitic Affections of the Uveal Tract.	63 per cent.	37
(f) In Syphilitic Affections of the Retina and Optic Nerve (atrophy of optic nerve.	58 per cent.	42
(g) In Syphilitic Affections of the Ocular Muscles (tabes and paresis).	26 per cent.	74
(h) In Syphilitic Affections of the Orbita and Fifth nerve.	100 per cent.	—
Therefore in luetic affections of the eye, on the whole, about.	65 per cent.	35
If we compare with these Plaut's statistics on general syphilitic symptoms about.	77 per cent.	23

When we consider, on the one hand, that this collection contains a series of ocular affections (parenchymatous keratitis, ocular palsies in tabes, etc.), which are scarcely or not at all influenced by the former antisyphilitic remedies, and, on the other, that the publications were not always given with oculistic exactness and that the time of observation of eventual relapses is too short, we are forced to the conclusion, that the luetic eye-diseases react less promptly to salvarsan than the other syphilitic manifestations.

No case of blindness has been observed after salvarsan, but the following ocular and aural affections, most peculiar to the tertiary stage of lues, have been noted: In 15 cases, iritis; in 3, chorioiditis; in 15, optic neuritis; in 8, ocular palsies; and in 9, ear affections, viz., labyrinthine and vestibular phenomena, and acoustic neuritis. The majority of authors regard, with Ehrlich, these symptoms as relapses of lues "in alio loco," and emphasize that the nerves pass through narrow canals of the bone, which are lined with tough connective-tissue, and which, as places of predilection for nests of spirochætæ, escape the therapeutic impact. Others explain these apparent relapses as the action of endotoxins or as Herxheimer's reaction, a consequence of mechanical pressure on the nerve by transient swelling of the periosteum in the osseous canals. Others still attribute them to a combination of luetic manifestations and the influence of arsenobenzol, especially through decomposition. Hence Stuelp concludes that salvarsan ought to be used in ophthalmology only: (1) If a speedy action is desired, as in primary ocular affections, or in secondary or tertiary symptoms, if a rapid impairment of function is dreaded; (2) in cases which do not tolerate, or respond to, mercury or iodine. Otherwise, an attempt with our well-proved antisyphilitic treatment ought to be made.

The most rigorous sepsis with salvarsan is indicated in ocular symptoms of tabes and paresis. This applies especially to the pupillary symptoms, on account of the difficulties of exact examination of the pupillary reaction. In tabes and paresis, salvarsan is indicated only if a positive Wassermann reaction and irreparable degenerations indicate the existence of active luetic products, and after the patient and their relatives are made acquainted with the eventual deterioration of the condition and accidental results. These are local from infiltration, or ocular, such as pericorneal injection, cyclitic irritation, scintillating scotomata, transient amaurosis, glaucomatous increase of tension, and general fever, vomiting, diarrhea.

polyuria, tenesmus in rectum and bladder, albuminuria, hemorrhagic nephritis, diabetes, icterus, exanthemas, herpes zoster, fluctuations of blood-pressure, irregularities of pulse and action of the heart, and nervous disturbances of which the patients must be informed beforehand.

The contraindications are: (1) Non-luetic diseases of the optic nerve and retina; (2) neuroses and organic diseases of the heart and blood-vessels; (3) severe diseases of the lungs, excepting tuberculosis if there is no hemoptysis; (4) severe non-luetic nephritis and diabetes; (5) severe visceral lues, ulcers of the stomach; (6) advanced degeneration of the nervous system and alcoholism; (7) severe congenital lues of the newborn; (8) febrile diseases of various kinds; (9) menstruation; (10) senile degeneration, non-luetic marasmus and cachexia. The advantages of salvarsan, compared with mercury and iodide, are: (1) If it is effectual, it generally acts more promptly, so that one injection of salvarsan is equivalent to one week's energetic mercurial treatment; (2) it shortens the treatment in the hospital and decreases the spreading of syphilis; (3) in contrast with mercury it can be applied to the numerous tuberculous and slightly nephritic luetics. Finally the author makes some practical remarks on the best method of application which proved useful to him.

Schnaudigel reports the clinical histories of 21 cases which he injected with neutral emulsions of arsenobenzol into the gluteal region, with one exception (between the shoulder-blades). The results were very good in 4 cases of very severe hereditary parenchymatous keratitis. As frequently experienced with mercurial inunctions, the infiltration of the cornea of the second eye increased while that of the first affected cornea was subsiding. An unusually large papule of the iris disappeared six days after injection of 0.5 gm. of arsenobenzol. A luetic tarsitis which had existed for months also healed in a few days. Several cases of optic neuritis, papillitis, and papilloretinitis, healed also in a relatively short time; one of incipient papillitis was arrested. A palsy of the superior oblique in a case of spinal lues with considerable ataxia recovered in about six weeks. The general condition of a man affected with tabes, reflex immobility of the pupils and mydriasis, showed remarkable improvement three weeks after the injection of 0.6 gm. The results were most striking the sooner the infiltration following the injection subsided. There was only one failure. Schnaudigel considers arsenobenzol as a remedy of enduring value for ophthalmology.

Flemming reports his observations in 180 cases of syphilis treated with salvarsan. The greatest part of the cases came from the dermatological clinic of the Charité, some from the internal and neurological clinics. Most of the syphilitic eye-diseases, seventy-two in number, were observed and controlled for a longer time at the eye clinic. The Wassermann reaction was applied in each case, and salvarsan was injected subcutaneously from 0.3 to 0.7 gm. per kilogram body-weight of adults, and 0.008 gm. per kilogram in children. Flemming considers this method as the most expedient. In none of the cases did it produce lasting disturbances. In almost all cases the action of arsenic was shown by increase of weight and of vision, *e. g.*, from 5/5 before the injection to 5/4 after it. With very few exceptions, there was not a much more rapid improvement than with other antisiphilitic remedies. Frequently, intense subjective disturbances, as headache in papillitis, irritation in interstitial keratitis, or lancinating pain in tabes, promptly disappeared after injection; but the anatomical pictures of keratitis, iritis, papillitis, or the pupillary alterations in tabes did not change faster than after mercury and the iodides.

The clinical reaction gave the impression of a specific and elective effect, but it does not suffice for a cure. A "therapia sterilisans magna" for man does not exist.

In some cases of specific keratitis in children, a decided influence was apparent in the rapid decrease of irritation, but in others no influence was apparent; while in some it was only noticeable in connection with mercury and the iodide. More was accomplished in recent and old cases of iritis. In specific opacities of the vitreous, the action was very prompt, *e. g.*, in one case V. rose within two days from 5/1 and 5/25 to 5/10 and 5/7.

Not the slightest result was obtained in sympathetic ophthalmia, and enucleation had to be performed. In a case of choked disc almost complete recovery followed after two weeks; in others and in syphilitic endarteritis of the eye, in concordance with Oppenheim, not the least effect was seen. Complete ocular palsies, atrophy of the optic nerve and papillary disturbances in metasyphilitic diseases were not influenced.

In 10 cases, pupillary differences in otherwise healthy eyes were observed before and after injection; in 3 cases before, in 7 after injection. All were in the secondary stage, *i. e.*, from a few months to two years after infection. So far pupillary differences were described only in metasyphilitic forms. Probably these pupillary disturbances in relatively recent lues were not observed before, because patients with secondary symptoms without iritis rarely consult an oculist or neurologist, and other specialists pay less attention to measurements of the pupils. Flemming considers the occurrence of paresis of the facial and ocular nerves, and optic neuritis observed by some authors and attributed to the action of arsenic, as syphilitic manifestations, because they were unilateral, whereas such affections from intoxication by atoxyl, etc., were without exception bilateral. Relapses occurred in eight out of the 180 cases. Whether they are more frequent after salvarsan or mercury cannot yet be decided. Flemming says as far as we can judge, since the short time that salvarsan has been in use, it must be welcomed as an effectual specific remedy in syphilis of the eye, which seems especially indicated in cases in which, after failure of mercury and the iodide, speedy aid is urgent. It has not proved the panacea for ocular syphilis, that can entirely supplant our usual specific preparations. On the other hand, deleterious effects of arsenobenzol on the eye have not been observed. These must be considered as symptoms of lues which existed without injection, but gained greater importance by the injection in the sense of Herxheimer's reaction. Seventeen cases, illustrating maximal and minimal values of reaction, are tabulated.

In a former communication on 14 cases (*Ophthalmology*, April, 1911), von Grosz stated that simple atrophy of the optic nerve, which occurs mostly as a consequence of tabes, is a contraindication to "606." Now he waives this contraindication, if the remedy is otherwise indicated. In some of the 60 cases of syphilitic eye affections, he observed, as accessory symptoms, slight necroses of the skin, and in three cases small corneal infiltrations, which healed eventually. Three cases required a second injection; and cases of iritis, optic neuritis, and ocular palsies, which developed after a relapse of lues, were cured in a similar manner. This proved that these affections were simply relapses and could not be ascribed to arsenobenzol.

Von Grosz concludes: Arsenobenzol is uninjurious for the optic nerve. Aggravation of an existing eye-disease through the remedy is not to be feared. Improvement of simple optic atrophy is not to be expected, but

this is not a contraindication to its application. A favorable result is most likely in luetic iritis, chorioretinitis, direct luetic ocular palsies, and finally in suitable cases of parenchymatous keratitis. Nothing can be said as to lasting cures, as this requires much time.

The experience gained from the use of atoxyl led Ehrlich especially to caution against the use of "606" without a previous careful examination of the eyes. Over 100 cases of blindness have been reported following the use of atoxyl. Schanz had opportunity to examine a considerable number of patients treated with "606," and in no case was there any eye-lesion attributable to its use. In the literature on salvarsan there is as yet no case known where blindness has followed as was the case after using atoxyl.

The question whether "606" is to be used in atrophic conditions of the optic nerve is an important one. Where the cause is possibly specific there is a possibility of arresting the condition. Is it justifiable to use a preparation somewhat allied to atoxyl when the latter produces optic nerve atrophy? The characteristics of atoxyl atrophy are well known and have been anatomically studied. Schanz advises the use of "606" even in the optic atrophy of tabes. The after-effects, as reported now from a number of reliable sources, do not warrant a fear of its working harmfully, and there is, moreover, the possibility of arresting the atrophic process.

Siegrist emphasizes that the morbid agent of sympathetic ophthalmia undoubtedly resembles the agent of syphilis. In sympathetic ophthalmia, as in syphilis, it may remain latent for months and years, and then suddenly become active. Relapses are frequent in both diseases, and since there is a great similarity between sympathetic ophthalmia and syphilis, salvarsan is used by ophthalmologists in incipient and fully-developed sympathetic ophthalmia. Siegrist therefore injected 0.3 grm. of "606" into a patient, aged sixty, with sympathetic ophthalmia. V. which was 15/100 immediately before injection, rose on the third day to 9/10, with almost complete disappearance of the opacities of the vitreous.

Schanz reports 2 cases of syphilitic optic neuritis following treatment by injection with salvarsan. In both cases the condition of the nerve was cured by repetition of the injection of salvarsan. The optic neuritis could not have been caused by the first injection. In both cases the eyes were examined before the first injection and very slight change in the disc noted. The changes, though noted on the histories at the time, were not considered significant. Some months later the optic neuritis had seriously interfered with vision. That an inflammatory condition had remained latent for some months appears improbable. It was certainly a recurrence of the syphilis due to lack of complete cure after the first injection of the salvarsan.

A number of cases of recurrence of syphilis, as shown in the eye, have been reported. Axenfeld and Cohen saw recurrence in the form of specific iritis. Fisher, Fehr, Hesse, Tolnai, have all seen luetic recurrences in the eye after salvarsan treatment.

Jansen states, that several days after an intravenous injection of 0.4 grm. of salvarsan, the patient happened casually to mention that, commencing four hours after the injection, everything seemed to waver before his eyes for three hours. Jansen believes that if this occurrence were closely studied, irritation of the optic nerve (*heftiges Flimmern*) might be found frequent after injection of this drug.

Gerber states that salvarsan, if correctly used, is an effective and

absolutely safe therapeutic measure for oto-laryngological affections. He attributes the absence of much clinical data by specialists in this field to the fact that the specialists did not obtain it until it was put on the market. He has tested its effect in 12 cases of lues, one of scleroma, two of angina, and one of scurvy. He used both the intramuscular and intravenous methods, but prefers the latter, since he found that though in it the immediate after-effects are more unpleasant, the course of treatment is much smoother. However, by neither method did he encounter any permanent ill effects, though he did not restrict the size of the doses. In one instance, he administered to a delicate woman a second intravenous injection (0.6 gm.) a few weeks after an intramuscular injection of 0.3 gm. In instances where the lumen of the vein was missed, slight infiltrations arose at the brachialis anticus, but caused no serious inconvenience to the patient. All the luetic cases reported by Gerber had been previously treated without effect. Under salvarsan therapy the secondary cases were relieved in four to nine days, and all but one of the tertiary cases were relieved in four to fourteen days. This one case—necrosis of the nasal maxilla, a condition which is always relieved with difficulty—healed after six weeks. One was a case of stenosis of the larynx, on whom every possible procedure had been ineffectively attempted, and which had necessitated repeated tracheotomies. Four days after the injection, the dyspnea and the laryngeal stenosis disappeared. In almost all the cases, the Wassermann reaction became negative. Equally good results were obtained in treating Vincent's angina and scurvy. The results in the latter instance open up the possibility of effecting a cure by this therapy in cases where an ulcerous non-specific process exists. In the one case of scleroma reported, a negative result was obtained, but the author feels that this was merely due to an insufficient dose.

Rost reports his experiences with salvarsan in the treatment of the tropical diseases—framboesia, lepra, and granuloma tropicum. He used only the intramuscular method and had no unpleasant results, even though some of his patients were as young as three years, and some were cases in which the disease had been developing for several years. Caucasians, negroes and Indians reacted alike to the injections. In all, 300 cases of framboesia were treated and showed satisfactory results. About twenty-four hours after the administration of the drug—in 3 cases as early as sixteen hours after the injection—a fine white peripheral ring formed around the swelling; they lost their turgor and began to dry up. After five or six days only crusts were left which could be taken off easily with the finger nail, and disclosed a tender smooth layer. The swellings in the lymph-glands also disappeared rapidly. Nasal conditions alone did not respond favorably; in 2 cases the whole body healed but the nose remained uninfluenced. Alston, who experimented upon some of Rost's cases by injecting the serum of patients treated with salvarsan, obtained good results. Nine case of lepra were treated, the ages of the patients ranging from fifteen to forty years. A dose of 0.5—0.6 gm. of salvarsan was given, but no definite change was observed. The same unsatisfactory report is made of this method of therapy for granuloma tropicum.

Alston has found salvarsan to be the most effective drug for use in framboesia. Of the 21 cases injected, thirteen were entirely cured, three on the road to recovery and five stationary. The serum of cases recovering under salvarsan when injected into cases of framboesia has a curative effect apparent as early as the fourth or fifth day. Alston also injected a goat with "606" and fed the milk to two children. Improvement was noted on the third day with complete recovery in fourteen days.

Following the method of Bokay, Mayerhofer used salvarsan in the treatment of a stubborn case of chronic recurrent post-rheumatic chorea minor and obtained excellent results. The patient was a girl, aged seven years, in whom the condition had been existing for three years. Mayerhofer effected a cure after two injections (one of 0.25 gm. and the other of 0.5 gm.) in the course of two months. After-effects, such as fever, pain, loss of weight and even cutaneous necrosis, he regards of little significance as compared with the cure. He enthusiastically recommends this therapy.

Montesanto states that arsenobenzol in subcutaneous injection or given intravenously in small doses is without action on Hansen's bacillus. Average doses given intravenously have certainly an effect which is seen in the Herxheimer reaction on the surface of the leprous lesions. Large doses of salvarsan possess destructive qualities in regard to Hansen's bacillus, though not destructive enough to prevent the invasion of the organism. Salvarsan brings about cicatrization of the leprous ulcerations, but it is ineffective in lepromas and ulcers. Montesanto gives two indications for treatment of leprosy by "606": (1) In the beginning of the disease when one may suppose that the number of active bacilli is still small; and (2) where there is a loss of substance on the surface of the integument.

Czerny and Caan have studied the effect of salvarsan injections in a number of cases of malignant tumors. In all these cases they had recourse to intramuscular injections. They are of the opinion that in all cases of inoperable malignant tumors, where there is a positive Wassermann reaction, treatment by salvarsan should be essayed. In a number of epitheliomas the result was at least an amelioration of the pains. This was also observed in many cases of sarcoma in which a softening of the neoplasm after the injection was noted. In a case of sarcoma of the parotid, in which there were two relapses after extirpation, the injection of salvarsan into the tumor itself combined with gluteal injection of the medicine resulted in the elimination of the tumor by necrosis of the mass; and a complete cure took place which has now lasted for many months. In regard to this tumor, it should be stated that the histological examination left some doubt as to its real sarcomatous nature.

A case of lymphosarcoma after an injection of salvarsan showed a slight amelioration in a passing diminution in the ganglionic masses, but this was only temporary, for shortly afterwards the issue was fatal. Two other cases of lymphosarcoma were not at all influenced.

The authors think that even when tumors are operable, it is necessary, provided there is a positive Wassermann reaction, to inject salvarsan before recourse is had to operation. It should be stated here that this treatment should not be followed in cachetic and feeble persons.

PNEUMONIA: IMMUNITY AND TREATMENT.

A REVIEW OF RECENT LITERATURE.

By S. STROUSE, M. D., of the Editorial Staff.

1. Rosenow: Anaphylaxis and the Toxic Substance from Virulent Pneumococci. (*Journ. Amer. Med. Assoc.*, LVII., p. 285, 1911.)
2. Strouse and Clough: Blood-Cultures in Pneumonia. (*Bull. Johns Hopkins Hosp.*, XXI., p. 247, 1910.)
3. Neufeld and Haendel: On the Production and Testing of Anti-pneumococcus Serum, and on the Outlook for a Specific Treatment of Pneumonia. (*Zeitschr. fuer Immunitaetsforsch.*, III., p. 159, 1909.)
4. Neufeld and Haendel: On the Origin of the Crisis in Pneumonia, and on the Action of Pneumococcus Immune Serum. (*Arbeit a. d. Koenig. Gesundheitsamte*, XXXIV., p. 166, 1910.)
5. Neufeld and Haendel: The Significance of Atypical Varieties of the Pneumococcus. (*Arbeit a. d. Koenig. Gesundheitsamte*, XXIV., p. 293, 1910.)
6. Seligman and Klopstock: Experiments to Explain the Pneumonic Crisis. (*Zeitschr. fuer Immunitaetsforsch.*, IV., p. 103, 1909.)
7. Boettcher: Studies on Bacteriotropins of the Blood-Serum in Pneumococcus Infections of Rabbit and Man. (*Deutsch. Archiv. fuer klin. Med.*, XCVIII., p. 93, 1910.)
8. Strouse: Phagocytic Immunity in Pneumococcus Infections and in Pneumonia with Relation to the Crisis. (*Journ. Exper. Med.*, XIV., p. 109, 1911.)
9. Rosenow: A Bacteriological and Cellular Study of the Lung Exudate During Life in Lobar Pneumonia. (*Journ. Infect. Dis.*, VIII., p. 500, 1911.)
10. Strouse: Experimental Studies on Pneumococcus Infections. (*Journ. Exper. Med.*, XI., p. 743, 1909.)
11. Dold: The Bactericidal Action of the Blood-Plasma and Serum on the Pneumococcus, and Its Relation to Immunity. (*Arbeit a. d. Koenig. Gesundheitsamte*, XXXVI., p. 419, 1911.)
12. Schneider: On the Mode of Action of Pneumococcus Immune Serum. (*Centralbl. fuer Bakteriolog.*, 1st Abteil., Ref., XLVIII., p. 271, 1910.)
13. Lamar: Chemo-Immunological Studies on Localized Infections. (*Journ. Exper. Med.*, XIII., p. 1, 1911.)
14. Bruning: Pneumonia in Children, and Pneumococcus Serum. (*Deutsch. med. Wochenschr.*, XXXV., p. 1828, 1909.)
15. May: Action of Roemer's Antipneumococcus Serum in Croupous Pneumonia, with Especial Regard to the White Blood-Corpuscles. (*Muench. med. Wochenschr.*, October 13th, 1908.)

16. Krische: Serum Therapy of Croupous Pneumonia. (*Med. Klinik.*, XLIV., p. 1681, 1908.)
17. Monti: The Treatment of Genuine Pneumonia with Roemer's Serum. (*Arch. fuer Kinderheilk.*, XL., Heft. 1 and 2, p. 45, 1908.)
18. Stoner: A Résumé of Vaccine Therapy. (*Amer. Journ. Med. Sciences*, CXLI., p. 186, 1911.)
19. Rosenow: The Autolysis of Pneumococci and the Effect of the Injection of Autolyzed Pneumococci. (*Journ. Amer. Med. Assoc.*, LIV., p. 1843, 1910.)
20. Mitchell: The Limelight on Pneumonia. (*Medical Record*, LXXX., p. 264, 1911.)

Students of pneumonia have been compelled to pursue a slow, steady course in their attempts to unravel the mystery of the disease and to effect a rational cure. Pneumonia offers a peculiarly fascinating and baffling problem to the student, standing as it does almost alone in any classification of infectious diseases. Acutely violent in its onset, course and termination, and associated with a most remarkable bedside phenomenon—the crisis, attempts to know the disease have necessarily centered around attempted explanations of the onset, around studies of the changes in the body during the short period of infection, or around the crisis. As for its onset, earlier work has shown definitely that all people may harbor the pneumococcus at some time and that some people harbor it all the time, but what the exact nature of the change in the host or in the infective agent may be, which determines the onset, is no more understood to-day than it was when the term “lowered resistance” was first used. And to-day when the terms of immunity reactions are being translated into accurate chemical formulæ, “lowered resistance” must be considered merely words to hide our ignorance. The possibility, that some phase of the phenomenon of anaphylaxis may account for many of the symptoms of pneumonia, has been suggested by recent work of Rosenow. The similarity in the explosive suddenness of the onset to the instantaneous anaphylactic reaction is too striking to pass unnoticed; but as yet the two phenomena have not been correlated, and the sum of our knowledge of the onset of pneumonia must be embraced in the hypothesis that either the pneumococcus becomes more virulent or that something happens to the host to permit the entry of the coccus into the body.

As to the nature of the disease, opinion has veered to the conception of it as a general bacteremia and toxemia associated with inflammation of the lung. Just as in typhoid fever blood-cultures revealed the fact that typhoid was not a mere inflammation of the bowel, so in pneumonia the same means of study demonstrated the presence in a large proportion of cases of the pneumococcus in the circulating blood. Formerly the opinion was held that only in severe cases could the pneumococcus be isolated from the blood, and its presence was considered of grave prognostic value; but the work of Prochaska in Zurich, of Rosenow in Chicago, and of Strouse and Clough in Baltimore proved that in certain epidemics, at least, pneumococcemia was a common occurrence and had no prognostic significance. Whether the organisms entered the blood before or after invasion of the lung has never been settled; and it is doubtful if this question has more than a theoretical interest, for surely the source of the “toxines” that produce the symptoms must be the local disturbance in the lung.

Undoubtedly the study which offers most promise deals with the means

whereby the human body defends itself against invasion, for only with clear ideas of this mechanism can prospects of a specific cure be entertained. Up to quite recently certain facts in relation to the resistance of lower animals to pneumococcus infections gave a powerful stimulus to work along the lines of phagocytosis. The other known antibodies had been found wanting, and the early work of Mennes showed the presence of a substance in the serum of immunized animals, which increased the phagocytosis of pneumococci. Then the refractoriness of most lower animals to pneumococcus infection bore a distinct relationship to their ability to produce phagocytosis. The remarkably encouraging work of Wright and of Neufeld added extra stimulus to the study of opsonins in pneumonia and in other pneumococcus infections; and it was not a broad jump to conclude from the presence of leukocytosis and of phagocytosis in pneumonia that the immunity of the crisis was a phagocytic immunity. The culmination of these studies arrived with the demonstration of opsonins in the circulating blood of pneumonia patients, and here the studies of Neufeld and his associates in Berlin stand prominent. The facts as they stand to-day are that opsonic immunity does occur in pneumonia, and that it may be increased after crisis.

But there is a gradually increasing dissenting view to the effect that the crisis may after all not be due to phagocytosis of the pneumococci. In the first place, were such a simple phenomenon the sole cause of the change, better practical results should have been obtained in treatment with opsonic serum. Then the inability of other authors to substantiate the claims regarding the presence of opsonins (Seligman, Boettcher, and Strouse); the recent work of Rosenow showing that the destruction of pneumococci in the lungs of pneumonia patients is as great in the patient that dies as in one that recovers; and finally the proof that other factors may play an important rôle in protection against the pneumococcus, all pointed toward the supposition that in the discovery of one detail other more important ones had been overlooked. For instance, it was found that the rule of resistance of animals by increased phagocytosis was not upheld by the one species which is totally resistant. The pigeon cannot be infected with pneumococcus, and yet neither its serum nor its leukocytes possess any increased phagocytic properties for the pneumococcus, and it is believed that the immunity in this case is due to the normal high temperature (Strouse). Then Dold claims to have found a "pneumobactericidal" substance in the blood and plasma of normal human beings, which plays an important rôle in the resistance during pneumonia; and Schneider finds similar bodies arising from the leukocytes. Furthermore, the complete studies on the many other properties possessed by leukocytes—both so-called immune bodies and ferments, and the likely supposition that they possess many other properties still unknown, renders unjustifiable any reasoning making leukocytosis and phagocytosis equivalents. The chemical side of the immunity in pneumonia is now being studied, and already Lamar has obtained most interesting results showing that such a simple soap as sodium oleate profoundly alters the structure and properties of the pneumococcus, and renders it easily acted upon by an immune serum. If it is remembered that soaps are present in exudates, the importance of Lamar's work is great. The newest thought in the chemistry of pneumonia is that offered by Mitchell to the effect that the symptoms of pneumonia are due entirely to calcium starvation. Hidden in a haystack of dogma, and theoretical as is his contention, it is nevertheless based on some fundamental facts. The theory of calcium

starvation is one so easily proved or disproved by experimental methods, which Mitchell did not use, that it is necessary to withhold an opinion of the value of his theory until experimental data are forthcoming.

Unsatisfactory as is the state of knowledge regarding immunity in pneumonia, specific treatment is even less satisfactory. The immune serum of Roemer has been extensively used, and the reputed results vary greatly. That such variation is due at least in part to biased judgment or incomplete observation seems natural. Bruning treated 6 cases in children without good results; May saw practically no differences in the cases treated with or without serum; Krische reports favorable results, as does Monti. Vaccine therapy has also been employed, but as yet vaccine therapy cannot be considered very successful in acute febrile conditions, and the results in pneumonia must remain doubtful. Anyone, who has had experience in the treatment of this baffling disease, must realize how fallacious are conclusions drawn from any line of treatment except in a very large series of cases. The death-rate varies in different epidemics and different localities, and in any single season the first twenty-five cases may get well under the same treatment as permits the next twenty-five to succumb. Hence the statistics collected by Stoner, showing 135 recoveries in 155 cases treated with vaccines, must be accepted with caution.

Something different from the usual vaccine treatment was Rosenow's discovery of the effect of washed, autolyzed pneumococci on an infection. He had previously shown that suspension of virulent pneumococci in salt solution had a marked effect on the bacteria, rendering virulent organisms avirulent; and he subsequently found that the bodies of the bacteria so treated used as a vaccine had a decidedly beneficial effect. As yet he has not published clinical observations, but the subject offers much promise.

DISTURBANCES IN THE RIGHT ILIAC FOSSA.

A REVIEW OF RECENT LITERATURE.

By JESSE S. MYER, M. D., of the Editorial Staff.

1. Martin: The Significance of the Lane Kink of the Ileum. (*Surgery, Gynecology and Obstetrics*, January, 1911.)
2. Mayo, C. H.: Intestinal Obstruction Due to Kinks and Adhesions of the Terminal Ileum. (*Surgery, Gynecology and Obstetrics*, March, 1911.)
3. Wilms: The Movable Cecum as the Cause of Many Cases of So-Called Chronic Appendicitis. (*Deutsch. Med. Wochenschr.*, October 8th, 1908.)
4. Wilms: Chronic Appendicitis and Cecum Mobile. (*Arch. Klin. Chir.*, July, 1911.)
5. Klose: Habitual Torsion of the Movable Cecum. (*Muench. Med. Wochenschr.*, No. 7, 1910.)
6. McWilliams: Carcinoma of the Vermiform Appendix. (*Am. Journ. Med. Sciences*, CXXXV., 1908.)
7. Harte: Primary Carcinoma and Sarcoma of the Appendix Vermiformis. (*Annals of Surgery*, June, 1908.)
8. Horsley: Carcinoma of the Bowel and of the Appendix in the Young. (*Journ. Amer. Med. Assoc.*, May 8th, 1909.)
9. Editorial: Cancer of the Appendix. (*Journ. Amer. Med. Assoc.*, January 14th, 1911, p. 122.)
10. Leconte: Carcinoma of the Appendix with Metastases to the Ileocolic Glands. (*Annals of Surgery*, June, 1908.)
11. Brunton and Glover: A Case of Malignant Disease of the Vermiform Appendix. (*Lancet*, February 12th, 1910.)

Despite the fact that our attention has been rather prominently directed to the right iliac fossa for some years, it has remained for the past year or two to bring to our notice several conditions of decided importance, from a standpoint of diagnosis and treatment. Mr. Lane some months ago called attention to the rather frequent existence of kinks or bends in the terminal four inches of the ileum, and since that time a number of surgeons have corroborated his observations. As to the exact cause of this condition, there seems to be some variety of opinion. In fact, there seem to be several factors which, working alone or together, may give rise to such a condition; thus where the large bowel is unduly movable, or where there is a general ptosis of the abdominal viscera, usually in such cases following extreme loss of fat, and in the condition known as enteroptotic habitus. Again, the condition seems to be associated with inflammatory processes, and Mayo has found the condition most frequently in association with chronic inflammation of the appendix. On the other hand, it occasionally appears to be congenital. From what-

ever cause they may arise, the peritoneal bands are often quite thick, passing from the terminal portion of the ileum to the parietal peritoneum, and sometimes to the cecum, causing the kink. As to the symptomatology, since this condition and appendicitis are so often associated, it is not always possible to differentiate the two. Like pathological conditions in the appendix, symptoms arising from the Lane kink are usually referred to the stomach, and the patient complains of various "dyspeptic" symptoms. The region of the kink is usually tender, extending from the umbilicus downward to the right, while localized pain may also be obtained. The pain is increased by peristaltic activity, especially when this is caused by the activity of the individual. The intestinal and gastric symptoms are often more marked at fairly regular periods after eating, and frequently there is a distension of the small intestine in evidence when the individual is fatigued. In some cases there is constipation, but this is by no means a constant symptom. The relief from the condition by operative means consists in severing the restraining bands and preventing new adhesions.

One condition, which it seems bears some relation to the foregoing, was brought to our attention by Wilms a few years ago. It is not unusual in operations for chronic appendicitis, to find very little disease of the appendix, and in a certain number of such cases to find the patient little relieved after the operation. In fact, if surgeons were more particular to observe the end-results of their cases, this coincidence, in Wilms's opinion, would be much more striking. He has found in many cases, diagnosed as chronic appendicitis, a long and unduly movable cecum, and in certain cases in which appendectomy failed to remove the symptoms, and a second operation, aimed at correcting the undue mobility of the cecum, cured the patient. In 5 cases in which he noted at operation a distinctly movable cecum, but in which only a simple appendectomy was performed, there was no relief following the operation. The condition is most often associated with the enteroptotic habitus, and is variously estimated that from 10 to 23 per cent. of individuals have a mesocecum, that is an unusually movable cecum. In not all of these cases does the condition give rise to symptoms. Just what causes the pain in these cases is still a matter of dispute. The fact that relief is often obtained after appendectomy suggests that the pull of a distended cecum on a short mesenterium may be one cause of the symptom. Klose, on the other hand, believes that only a torsion of the cecum at its mesentery gives rise to complaint. If the abdominal press is sufficient, the fact that the cecum has a mesentery and may move is of no importance. Only after this abdominal counter-pressure is impaired by pregnancy or rapid loss of weight, does torsion with consequent symptoms occur. Colics, which are relieved by reclining posture, are especially characteristic of the condition. There is often constipation, followed by diarrhea and meteorism. The fact that the colics are fever free is especially significant. On palpation gurgling sounds can be elicited over the cecum, and there is often a distinct tumor. The x-ray will show bismuth in the cecum thirty-six hours or more after ingestion, while in the normal individual it should be beyond this point considerably before this.

So much thought has been given to the appendix itself, that it is with little surprise, we note, that it is only in quite recent times that particular attention has been paid to such an important condition as carcinoma of the appendix. Especially is this so since it seems that this condition exists in about $\frac{1}{2}$ per cent. of all appendices. That it has not been recog-

nized before is due, it seems, to the peculiar nature of the appendix carcinoma. These growths do not partake of the general characteristics of carcinoma, are quite benign, of very slow growth apparently, and occur in early life, 72 of 92 cases collected by Harte being in individuals under forty years of age. For these reasons, and on account of certain histological characteristics, some pathologists have classed these tumors as endotheliomata. In a material of 5,000 appendices, examined by McCarty and McGrath, carcinoma was found 22 times. In the majority of these cases, the growth was not large enough to be seen on the serosa, and the diagnosis was, therefore, impossible for the surgeon. None of the growths had produced metastases, and age seemed to have no influence upon their occurrence. Ninety per cent. of the tumors occurred in the tip of the appendices, which had undergone a partial or complete obliteration. This location of the growth is borne out by all other observers, as likewise the fact that the tumors occur in appendices involved in a chronic inflammatory process. It is probable, therefore, that there is some causative relation between the changes incident upon appendicitis obliterans and appendix carcinoma. Carcinoma of the cecum seems to be a distinct condition and only in very rare cases arises from appendix carcinoma. The symptoms of the condition are those of chronic appendicitis, and the diagnosis is practically impossible before opening the abdomen. Even at operation, unless the growth has invaded the muscular and serous coats, which it shows little tendency to do, the diagnosis is not made. It remains as a rule for the pathologist to discover the presence of the tumor. Metastases are a decided exception, and, as mentioned above, the tumors are essentially benign.

MEASLES.

A REVIEW OF RECENT LITERATURE.

By ALFRED FRIEDLANDER, M. D., of the Editorial Staff.

1. Sittler: A Hypothesis to Explain the Eruption of Measles. (*Muench. med. Wochenschr.*, No. 52, 1909.)
2. King: Measles and Mice. (*Washington Medical Annals*, March, 1910.)
3. Hamburger and Schrey: Diminution of the Susceptibility to Vaccine During Measles. (*Wiener klin. Wochenschr.*, No. 18, 1910.)
4. Karasawa and Schick: Antibodies in the Blood-Sera of Measles Cases against Diphtheria. (*Jahrbuch fuer Kinderheilkunde*, October, 1910.)
5. Sebillieu: Incubation Period of Measles. (*Gaz. Méd. de Nantes*, March 26th, 1910.)
6. Friedjung: Measles and Psoriasis. (*Deutsch. med. Wochenschr.*, p. 368, 1910.)
7. Rubens: Measles and Psoriasis. (*Deutsch. med. Wochenschr.*, p. 125, 1910.)
8. Schick: Measles and Tuberculin Reaction. (*Monatschr. fuer Kinderheilkunde*, Vol. IX., No. 3, 1910.)
9. Messa: Skin Tuberculides After Measles. (*Rev. di Clin. Ped.*, July, 1910.)
10. Brudzinski: Double Infections of Measles and Scarlet Fever. (*Arch. de Méd. des Enfants*, p. 1, 1910.)
11. Teilman: Measles Complicated with Emphysema. (*Hospitalstidende*, p. 225, 1910.)
12. Auerbach: Measles Epidemic. (*Arch. fuer Kinderheilkunde*, Vol. 55, p. 128.)
13. Lade: Diphtheria as a Complication of Measles. (*Archiv. fuer Kinderheilkunde*, Vol. 53, p. 128.)
14. Baldini: Hemorrhagic Measles. (*Arch. de Méd. des Enfants*, June, 1911.)
15. Siegert: Prophylaxis of Measles. (*Deutsch. med. Wochenschr.*, No. 31, 1910.)

Etiology.—Sittler has found a staphylococcus in the oral and nasal secretions of measles patients, which differed from *S. pyog. alb.* only through agglutination. The toxins of this germ pass into the circulation and the eruption of measles is thus to be considered as analogous to a serum exanthem. Definite proof of this theory is not offered, although King has reported several cases of measles in which infection seemed to be carried by straw containing excrement from mice. He assumes that in such cases there must be a dust inhalation, believing that the mice were

the germ-carriers. It is possible that this hypothesis affords an explanation of measles epidemics occurring in measles-free places, without the actual presence of measles patients.

Pathogenesis.—In the course of an investigation concerning the susceptibility of previously vaccinated children to vaccine lymph, Hamburger and Schrey found that during an attack of measles this susceptibility is much reduced. Whereas normal children previously vaccinated always showed a definite local reaction (*Stichreaktion*) on subcutaneous injection of diluted lymph, measles patients showed a marked reduction, probably to be explained on the basis of mutual effects of two infections on each other. The assumption that measles by virtue of its complicating catarrh of the upper respiratory tract, predisposes especially to diphtheria, has been studied carefully by Karasawa and Schick. They find, as the result of their studies on blood-serum of measles patients and normal patients, that measles as such produces *no* special predisposition to diphtheria; because during an attack of measles there is no diminution in the amount of antibody present in the blood-serum. It is not even settled, that the length of time of passive immunity is shortened by an attack of measles. As a result of clinical observation, Heubner had expressed the latter view.

Symptomatology.—Sebilleau has found certain symptoms regularly present during the incubation period of measles. Digestive disorders, with mild fevers, are common. The coryzal symptoms may be present, and disappear completely two or three days before the rash appears. A sudden and distinctly marked swelling of the cervical lymph-glands has also been noted. This glandular swelling disappears after the advent of the eruption.

Double Infections.—Friedjung reports a case of a girl of four, who for two years had had an unusually severe case of psoriasis. Ten days after admission to hospital she developed measles with pneumonia. During the attack the psoriasis scales fell off. During the next twelve years the girl had only a few mild attacks of psoriasis, which yielded readily to treatment. Friedjung suggests that repeated injections of serum in cases of psoriasis might cause a rash which would have a beneficial effect upon the psoriasis.

Rubens also records a case of severe psoriasis of fourteen years' duration in a man of twenty-eight, in which all the scales fell off on the third day of the eruption.

Schick reports the case of a child which had had repeated tuberculin injections on account of pleurisy. This child developed measles. With the advent of the eruption, the sites of the tuberculin injections became markedly reddened and showed distinct infiltration. The measles eruption became distinct at these areas long before it appeared elsewhere, showing the effect of the previous local irritation. Messa reports a case of a scrofulous child, in whom as the result of measles a necrotic tubercular dermatitis developed.

As a result of a study of 12 cases of double infection of measles and scarlet fever, Brudzinski comes to the following conclusions. The incidence of scarlet fever does not seem to predispose to measles. Recurrent measles was never observed as the result of scarlet fever. Furthermore, the incidence of measles did not seem to have a particularly bad effect upon the course of scarlet fever. The complications commonly seen in the two affections (otitis and bronchopneumonia) were common in cases of mixed infections. The character of the exanthem varied according to

whether the eruptions appeared simultaneously, or following each other. Desquamation was usually very marked in cases of mixed infection. Both types of desquamation were usually to be noted at the same time in these cases, so that the diagnosis of double infection could usually be made even at this period.

Teilman reports a case of measles in a girl of two and a half years complicated by capillary bronchitis. On the eighth day subcutaneous emphysema developed, appearing first in the cheeks and extending down to the pubes in front. Examination of the mouth showed a slight swelling of the mucous membrane in the region of Stensen's duct. The occurrence of the emphysema was attributed to forcible dilatation of Stensen's duct by the coughing. In this way the air was drawn into the subcutaneous tissue. The case ended in complete recovery.

Auerbach reports an epidemic of measles occurring in the infants' pavilion of a Hamburg orphan asylum. 66 cases were observed, 38 being under one year. There were eight infants under four months of age exposed, but none of them contracted the disease. 83 per cent. of the cases showed Koplik spots. Only three of thirty-eight children showed no complications. Twenty of the thirty-eight had pneumonia. The cases in the children under one year were much more severe than in the older children.

78 per cent. of all the cases had complicating otitis media. The total mortality was 37 per cent.; in children under one year, it was 50 per cent. In 14 of the cases there was a complicating diphtheria.

Lade, in a series of 112 cases of measles, had 13 showing a complicating diphtheria. He believes that the association of these two diseases is a very serious thing, and that the prognosis appears to depend inversely upon the difference in time between the measles eruption and the appearance of the membrane.

Baldini records several cases of measles of abnormal type. Among them was that of a child of twenty-five months. On the third day of the eruption a marked purpura occurred over the entire body. With this there was intense prostration. Temperature rose to 106° F. There was great disturbance in the gastro-intestinal tract. Blood present in the vomitus and in the stools. Death on the tenth day. According to the author these cases of hemorrhagic measles are excessively rare.

Prophylaxis.—Discussing the danger of contagion, Siegert says that it begins in the catarrhal stage, is at its highest in the transition period between the catarrhal and eruptive stages, and disappears only with the disappearance of the rash. Therefore any children not having had measles, who have been in contact with measles patients in the catarrhal stage, especially during the forty-eight hours preceding eruption, are to be regarded as infected. Inasmuch as the prognosis of measles in hospitals is very much worse than in homes with fair hygienic conditions, Siegert believes that special measures should be taken during measles epidemics in institutions. The practice of keeping acute and convalescent cases together, as well as simple with complicated cases, offers a good chance for the spread of the dreaded complications of diphtheria, scarlet fever, pneumonia and pertussis.

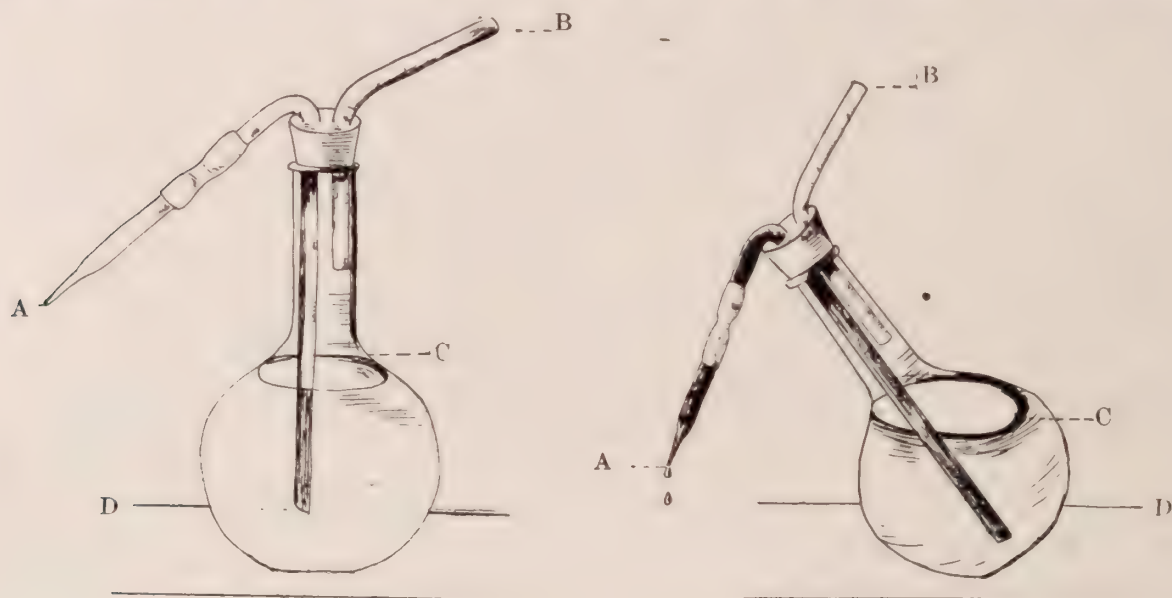
Therefore measles pavilions ought to be so arranged that they contain a large number of small isolation rooms, so that the cases may be kept separate as much as possible. Siegert even goes so far as to say, that uncomplicated cases of measles should not be admitted to hospitals.

PRACTICAL MEMORANDA.

HOW TO MAKE A WATER BOTTLE SERVE AS A DROPPER.

By S. STROUSE, M. D., of Chicago.

In every laboratory, no matter of what size, a water bottle is an essential; but often glass pipettes or eye-droppers are not found when needed. It is extremely simple to make an ordinary water bottle serve the purpose of a dropper in such a way as to regulate the number of



drops desired in a given time. This is done by converting the bottle into a siphon as illustrated by the sketches. With the bottle in the ordinary position, the exit tube A-D is filled with water by blowing on B; then the bottle is slanted so that the tip of the exit tube A is at or below the level of the water C in the bottle. A siphon is thereby formed, and the rapidity of the flow can be perfectly regulated by slight movements of the hand, raising or lowering the exit tip.

CONTROL OF PAIN FOLLOWING APPLICATION OF COPPER-SULPHATE CRAYON TO THE CONJUNCTIVA.

By JOHN GREEN, JR., M. D., of St. Louis.

None will deny the efficacy of copper-sulphate crayon for reducing or eradicating the granulations of trachoma. The ophthalmic world, with great unanimity, pins its faith to this method as proving, on the whole, the most successful non-surgical treatment. Unfortunately, the application has the disadvantage of causing much irritation and pain. The conjunctiva is intensely congested, the ciliary zone is reddened, and even the mucous membrane of the nose participates in the hyperemia. There are irritation with lacrymation and a deep-seated ache of the globe for several hours following the application. To lessen the pain various means have been proposed, the best being the local anesthetics—cocaine, holo-

caine, alypin, etc. But these fail to control to any extent the deeper ocular pain. Recently, Farnarier (*La Clinique Ophtholmol.*, April 10th, 1910) suggested that a 1 per cent. solution of acoin in oil be instilled immediately after the lids have been stroked with the copper crayon. He claimed that this method obviated not only the superficial irritation, but the deep pain as well. The writer has tried this method in 20 cases of trachoma, with the most gratifying results. The conjunctiva is first anesthetized with a weak cocaine solution (2 per cent.), the palpebral conjunctiva of the upper and lower lids is gently stroked with the crayon, and immediately a full-sized drop of acoin oil is instilled. The congestion and lacrymation following are very slight, and the deeper ocular pain is hardly noticeable. It is well to repeat the acoin oil drop in five or ten minutes.

"BANDAGES" FOR THE SURGEON'S FACE DURING OPERATIONS.

By FRANCIS REDER, M. D., of St. Louis.

The illustration gives a good idea of an efficient and a comfortable covering for the face during a hot-weather operation. The greatest concern for the surgeon during his hot-weather work is the care of the perspiration coming from his face. His greatest annoyance during his work is the careless and unsatisfactory mopping of his face by a nurse. Unless his face is properly cared for, frequent moppings have to be resorted to. This mopping is annoying, especially when the surgeon has to wear glasses, and, moreover, interferes with the work. Even when the mopping is well done, it is often unsatisfactory.



A piece of gauze thirty inches long, having a width of thirty-six inches, is folded so as to get eight layers, making the width of the "bandage" about four inches. Two of these "bandages" are necessary. One is placed about the forehead down to the eyebrows, and is secured behind with a safety pin. The other is placed so that it covers the sides of the face including the ears, the chin up to or including the mouth, and loosely resting against the throat. This bandage is secured on top of the head with a safety pin.

After operating, though the "bandages" be wet with perspiration upon removal, you can feel assured, nevertheless, that not a drop has escaped from the meshes, and that you have escaped the annoyance of mopping.

DIAGNOSTIC AND THERAPEUTIC NOTES.

PELVIC PERCUSSION.—Dionis and Sejour (*Gaz. des Hôp.*, 1911, No. 28). In connection with Ferrette the writers have discovered a method that promises to be valuable in diseases of the pelvic and lower abdominal viscera. If the anterior superior spines of the ilia are percussed, the note obtained on the two sides will differ in pitch and in resonance if there is a tumor or an exudate in or near either iliac fossa. This difference is most marked if the abdomen is distinctly tympanitic, a condition which would render the recognition of such lesions by the ordinary palpatory methods all the more difficult.

THE GERMAN METHOD OF TREATING MALARIA.—Werner (*Therap. Monatschr.*, 1911, No. 5). The Germans have studied the treatment of malaria with great care, both in Germany itself and in the German colonies in Africa, where the more severe forms are very prevalent. The general consensus of opinion favors Nocht's method. This consists in the administration of 0.2 gm. (3 grains) of quinine hydrochloride five times daily, making a daily dose of one gram or about 15 grains. This treatment is kept up for eight days. The after-treatment with smaller doses extends over two or three months. The results are said to be quite as good as with the more usual larger doses and the method has several advantages, such as the avoidance of cinchonism and of hematuria and the greater promptness with which the administration of quinine can be inaugurated.

Methylene-blue and arsenic have also an antimalarial action, but in this respect are not to be compared to quinine. The only other drug equal in efficiency to quinine is salvarsan in tertian malaria.

THE X-RAYS AND URINARY CONCREMENTS.—Telemann (*Deutsch. med. Wochenschr.*, 1911, No. 21). The writer points out that, whereas the statistics of Struempell, gathered in the pre-roentgenological period, indicate that a considerable percentage of all renal concretions are urate stones, the later statistics of Rumpel, based on *x*-ray investigations, seem to show that urate stones are rare, only one concretion in twenty-two being of this kind. To determine the cause of this discrepancy, Telemann studied the radiographic behavior of a great variety of renal calculi under various conditions. He found that when immersed in urine or imbedded in muscle-tissue, all stones were readily radiographed except pure xanthin stones and pure uric acid stones. The former are unimportant because of their rarity, the latter are not at all rare. When pure uric-acid stones are placed in surroundings resembling those in which they are found in the bladder or kidneys, and are then photographed by means of the *x*-rays,

they cannot be made out on the plate, since their opacity to x -rays differs but slightly from that of urine or muscle-tissue. Patients that clinically appear to have nephrolithiasis, but in which the radiographic examination is negative, may well be cases of pure uric acid calculus.

THE GASTRIC ORIGIN OF ANGINA PECTORIS.—Verdon (*Brit. Med. Journ.*, March 18th, 1911). In several cases of angina pectoris, the writer was able to abort the attack by introducing a stomach-tube into the stomach. A considerable amount of gas escaped through the tube, and the patient was almost immediately relieved of his pain. This observation is in harmony with the fact, generally known and noted in most text-books, that the anginal paroxysm often ends with the eructation of gas from the stomach. Verdon believes that in many, if not all, cases of angina pectoris, the attack is due to irritation of the vagus by the gastric meteorism. The proportion of cases due to coronary sclerosis, he believes, must be slight. Otherwise the percentage of deaths, due to angina pectoris, should increase with advancing age. The reverse is however true. In suitable cases, the stomach-tube treatment of this disease deserves a trial.

TESTING THE PUPILLARY REACTION.—Oppenheim (*Neurol. Zentralbl.*, 1911, No. 7). Oppenheim calls attention to a not infrequent source of error in testing the pupillary reflexes. It occasionally happens that, when electricity is used as a source of light, the pupils being tested by turning the light on and off, no reaction is obtained; whereas with the same patient, when daylight is used, the reflexes are seen to be normal. He believes that the sudden turning on of the electric light may cause an emotional shock that produces a pupillary dilatation sufficient to counterbalance the contraction due to the illumination. At all events, this is a possible source of error that should not be ignored.

THE SPINAL FLUID IN TUBERCULOUS MENINGITIS.—Hohn (*Berl. klin. Wochenschr.*, 1911, No. 18). If in a clear spinal fluid the amount of albumin is great, as compared with the bulk of the sediment, and if the latter consists, either solely or nearly so, of lymphocytes, and if the few polymorphonuclear cells present show evidence of degeneration, the meningitis is almost certainly tuberculous, even though the bacilli cannot be demonstrated.

A NEW TEST FOR BILE PIGMENT.—Guenther (*Med. Klin.*, 1911, No. 27). The following test for bile in the urine is said to be very delicate. To 5 c.c. glacial acetic acid add a trace (not more than 0.005 gm.) of magnesium-perhydrol, and boil. The urine is rendered strongly alkaline by means of a little sodium hydrate and is added to the above reagent. If the urine is dark and apparently icteric, only a few drops are used;

if pale, 5-10 c.c. are added to the reagent. If bilirubin is present, a brilliant green color results, either immediately or on boiling.

VINCENT'S ANGINA TREATED BY MEANS OF SALVARSAN.—Achard and Flandin (*Gaz. des Hôp.*, 1911, No. 50). The writers report a severe case of Vincent's angina with involvement of both tonsils and the soft palate. All treatment seemed of no avail. In view of the fact that one of the two etiological agents is a spirillum, local applications of salvarsan were inaugurated, first in solution, later as a powder. A surprisingly prompt cure resulted.

ANTIDIPHTHERITIC SERUM FOR HEMORRHAGE IN TYPHOID FEVER.—Marotte and Oui (*Arch. de Méd. milit.*, 1911, No. 4). Weil first called attention to the value of serum injections in hemophilia. In several cases of obstinately recurring hemorrhage in typhoid fever, the writers have found the same procedure useful. Diphtheria antitoxin was used, it being the most readily obtainable form of sterile horse-serum. Large doses were necessary, the injection of less than 50 c.c. being ineffectual, but in this dosage a prompt cessation of the hemorrhage resulted.

BOOK REVIEWS.

A HANDBOOK OF PRACTICAL TREATMENT. By many writers. Edited by John H. Musser, M. D., LL. D., Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia, and A. O. J. Kelly, A. M., M. D., Assistant Professor of Medicine in the University of Pennsylvania. Volume I. Philadelphia and London: W. B. Saunders Company. 1911. Price, \$6.00.

We confess to having entertained no small degree of expectancy in regard to the new work on therapeutics edited by Drs. Musser and Kelly. At the present day we hear so many rumors concerning therapeutic nihilism that a series of volumes written by so eminent a galaxy of contributors as those mentioned in the above, must inevitably prove a godsend. Limited space forbids a detailed review of all the chapters in the first volume. The introductory chapter on the "Fundamental Principles of Therapeutics" presents an accurate view of the correct methods to be followed in modern therapy. The chapter on dietetics is extremely practical. Dietetics in infancy is well presented, although more information on the home modification of milk would prove of the greatest interest to the majority of readers. In "General Principles of Drug Treatment" we find quality sacrificed to quantity. Many suggestions are extremely practical, but certain measures are incorporated that might better have been omitted. In many instances a whole array of medicaments is offered and the reader may use his discretion or good fortune in the selection of the best. There is nothing specific in the author's directions.

Thus, in uremia he advises the use of a wet-pack, omitting to state its caloric nature. The dosage of drugs is seldom suggested. "Serum Therapy" and "Organic Therapy" present the latest researches in those subjects. The "Rest Cure" and allied modes of treatment receive their proper consideration. Special methods are well illustrated. Hydrotherapy merits the appreciation that has long been withheld. The chapters on "Radio- and Electro-Therapy" will be welcomed by their special adherents. "Miscellaneous Measures" offers very practical information. The chapters on blood and the lymphatic system are concise, presenting the most approved methods of treatment.

THE EXPERIMENTAL CHEMOTHERAPY OF SPIRILLOSES. (Syphilis, Relapsing Fever, Spirillosis of Fowls, Frambœsia) by Paul Ehrlich and Hata. With contributions by H. J. Nichols, New York; J. Iversen, St. Petersburg; Bitter, Cairo; and Dreyer, Cairo. Translated by A. Newbold and Revised by Robert W. Felkin, M. D., F. R. S. E., etc., late Lecturer on Tropical Diseases, Edinburgh Medical School. With 34 tables in the text and 5 plates. New York: Rebman Company, 1123 Broadway. Price, \$4.00.

Any work to which Professor Paul Ehrlich gives his name must necessarily demand careful study, for he may be said to be the leader in experimental chemotherapy. It is, perhaps, to be regretted that these two volumes were not published before one or two incomplete publications saw the light, for it would seem to be necessary for the practitioner, who undertakes to treat cases with this new preparation, to understand thoroughly, not only the reasoning which has been employed in this production, but also to grasp the difficulties of the research, and appreciate fully the enormous amount of experimental work which was done before Professor Ehrlich and his colleagues were in a position to recommend the widespread introduction of this treatment to the medical profession throughout the world. No one can study these volumes without satisfying themselves that an enormous stride has been made in the treatment of relapsing fever, spirillosis of fowls, sleeping-sickness, and finally of syphilis. This English translation by A. Newbold is exceptionally good, and by comparison with the usual translation from the German, deserves commendation for accuracy and an intelligent interpretation of the spirit of the original work.

A MANUAL OF SURGERY. For Students and Physicians. By Francis T. Stewart, M. D., Professor of Clinical Surgery, Jefferson Medical College; Surgeon to the Germantown Hospital, Out-Patient Surgeon to the Pennsylvania Hospital. Second Edition. With 553 illustrations. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$4.00.

In its thoroughness and completeness this book is equal to many much more pretentious volumes, and it is valuable in that it brings its surgery right up to the latest phases as seen in practice. Originally intended only for undergraduates, as we learn from the preface to the first volume, the work has been prepared with the main idea of being both concise and complete; but there are few textbooks that can be so advantageously used in practice by physicians and surgeons. The descriptions of operative measures are models, though it seems rather unusual to find a surgeon naming medical remedies, particularly in tuberculosis. Nevertheless, it should be stated that tuberculin and its administration are fully discussed. All mooted questions are fully discussed in the light of various opinions, thus resulting in the book's best asset for the practitioner—namely, a judicious manner of presentation of the most recent advances in medicine and surgery.

LEHRBUCH DER KRANKHEITEN DES HERZENS DER BLUTGEFAESSE. By Dr. Ernest Romberg, O. Professor and Director of the Medical Clinic in Tuebingen. Second Edition, with 69 illustrations. Stuttgart: Ferdinand Enke. 1909.

This book of nearly 600 pages is an excellent treatise on the subject of heart and circulatory diseases. The first chapters are devoted to methods of examination and diagnosis. It is to be regretted that more space has not been given to this part of the book, for it is especially in this field that interest has centered in the past few years. The other chapters consider the organic heart diseases, diseases of the pericardium, organic diseases of the blood-vessels, heart and circulatory neuroses. Each part is followed by an extensive bibliography which makes the book especially valuable as a work of reference. A number of pages are devoted to the subject of arteriosclerosis. In the question of arteriosclerosis and nephritis the author takes the stand that the former process is not the direct cause of the pathological increase of connective-tissue in the kidney, but rather that the impaired circulation resulting from the arteriosclerosis makes the kidney more vulnerable and predisposes it to injuries resulting in nephritis.

The illustrations to the book are well chosen and a complete index is appended.

HAUTKRANKHEITEN SEXUELLEN URSPRUNGS BEI FRAUEN. Von Dr. Oskar Scheuer, Facharzt fuer Haut und Geschlechtskrankheiten in Wien. Berlin: Urban und Schwarzenberg. 1911. (Rebman Company, New York, Distributors for the United States.)

To every specialist, a careful study of the relation of his own specialty to other branches of medicine forms one of the most fascinating and fruitful features of his work. Familiarity with these borderlands is essential for the successful practice of any specialty, and the writer of this interesting monograph deserves credit for exploring thoroughly one of the less known borderlands. He discusses in a volume of 200 pages all skin manifestations of sexual origin observed in women. The material is well arranged in eleven chapters, thus enabling both the gynecologist and dermatologist to familiarize himself easily with the information at hand on any given question. How thoroughly the work has been done by the author may be deduced from the fact that the titles alone of the papers consulted and quoted in this volume fill 33 pages.

THE NON-SURGICAL TREATMENT OF DUODENAL ULCER. By George Herschell, M. D., Lond., Lately Senior Physician to the Kensington General Hospital and to the National Hospital for Diseases of the Heart, etc. London: Henry J. Glaisher. 1910.

This is a small volume of 40 pages, being a reprint from an article appearing in the *Clinical Journal*. The only unusual part of the author's method is the use of horse serum by mouth in the treatment of ulcer, on the theory that it contains bodies antagonistic to the destructive toxins causing the ulcer, and also stimulates tissue repair.

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EDITORIAL.

HOW TO WRITE A THESIS.

The value of a book should never be measured by its size, since this sort of reasoning is only too often at fault. Of course, as things go nowadays, we must have our money's worth or our commercial spirit is outraged; and when this happens woe betide the man who comes to us with the consolation that he, too, has been cheated. Now though the writer of these lines may or may not be as assertive as others in demanding full value for outlay of money in a book, he is quite sure he is not so insistent on bulk as are a goodly number of other readers, but pays some attention to contents; and is not too greatly depressed if the contents is crowded into a small space. A book that fits this argument to a nicety is Dr. H. D. Rolleston's "On Writing Theses for M. B. and M. D. Degrees," recently published by John Bale, Sons and Danielsson, London; for here we have very little bulk and a high quality that is well worth the price of one shilling—an insignificant sum, to be sure, at first sight—but not so insignificant when one takes into consideration that the pages are smaller in size than those in most books and their number but twenty-seven. One shilling for some twenty minutes' reading! Who would not cry out against the outrageous price.

But on closer study the kindly disposed reader, to whom we take it we are appealing, will find in these few pages much food for thought, if he happens to be one who has sought the reasons why medical papers are so deplorably lacking in those qualities which are, one might say, the life of all good literature. For on page 25 he will read, "Sir Michael Foster, whose textbook of physiology attracted a past generation almost as much by its manner as by its matter, had, his son tells me, made a critical study of Milton's prose writings. An eminent physician, whose writings are a

pleasure to read, had, I believe, saturated his mind with Addison's 'Spectator.' . . . Sir Clifford Allbutt offers many models, such as John Morley, George Trevelyan, Hardy, Barrie; and among medical writers, Sir Thomas Watson and Sir James Paget"; lines which should burn deep into his consciousness.

Now even though this imaginary reader will profit for the moment by this instruction, will he remember what preliminary work, in the matter of reading, he should do to achieve distinction in style when he sits him down to write an article for a medical publication? We doubt it, for the reason that directly he conceives an article of a medical nature, the perfection of its literary execution will be lost sight of, since his conceit, or his laziness, or his amour-propre, will stand him in good stead when he consoles himself with the thought that "really it's all of no importance since the article is just a medical one." This reasoning, we may add here, has done its work so effectively that, especially in our American journals, the things that are put forth in the name of science or medicine are, with few exceptions, a weariness to the soul of him who has been so misguided as to pay some attention to literary quality.

The matter of writing theses in this country is a negligible quantity; and perhaps our advancement beyond this means to an end—a doctor's degree—has much to do with our later efforts in the medical journals. Of course, as Dr. Rolleston points out, all theses in England and France are not written by the candidates; but even when "ghosts," men who eke out a living by writing and selling theses and scientific papers, are resorted to by the desperate students who are aware of their deficiencies, the coaching the candidate receives—he really only gets ideas which he has to dress up in his own individual way—is a lasting lesson. That this must be so is evident to everyone who has read the best English and French medical journals; for written large across the pages is a literary execution that is foreign to our publications. We may quarrel with the English on account of their insular heaviness, their mastery of detail, sometimes, it is true, carried to extremes, their interminable sentences; we may say of the French medical writers that too much artistry destroys the scientific nature of a paper, that what medical readers want is facts and not opinions that have the stamp of chauvinism; but, granting all this, must we not admit that by comparison with these publications ours are mediocre?

Someone has said that morality is a matter of geography, and we imagine that with this thought in mind the men who occupy the editorial chairs of our medical journals are quite disposed to say that the same thing applies to medical journalism. Have we not repeatedly heard of the superiority of our Eastern journals over their Western congeners?

Have we not willingly acquiesced in the matter, aware, as we must have been, that the medical culture in the East cannot be gainsaid? But was this humble spirit the outcome of a close study of the Eastern product? Or was it not rather the result of a mental superficiality that compelled us against our better judgment to grant certain journals the palm because of their geographical situation? Be the cause what it may, the facts, cold and hard, are declarative of the almost universal lack of scholarship in our medical journals and of the insouciance of even the "best" among them to what all European journals insist upon—namely, the thought of the writer so well clothed that grace of diction and a certain amount of classicism are paramount qualities.

THE THYROID GLAND.

Perhaps no field of medicine is more fraught with problems of practical and speculative interest than is that which deals with the elucidation of the mysterious activities of the so-called glands of internal secretion. Recent work points to the probability that all these glands, including thyroid, adrenal, hypophysis, pancreas and liver form a physiological combination, the proper functioning of which is absolutely necessary for the wellbeing of the body. A disturbance in any one of the parts of the intricate mechanism means a more or less severe derangement of some vital function of the whole. Diabetes mellitus, according to Von Noorden's theory, is always related to a pathological activity of the pancreas, either because of some injury to the organ itself or because the co-ordinating mechanism of the other glands of internal secretion is awry. Even though the absence of demonstrable anatomical lesions makes absolute proof of this contention impossible, the clinical manifestations and deductions are almost unanswerable. Practically in every disease associated with disturbed activity of any of the ductless glands there is an accompanying disturbance of carbohydrate metabolism, the nature of which depends on whether the original damage produces hyperactivity or hypoactivity of the gland.

In the elucidation of the theory of the interactivity of the internal secretions, the greatest amount of actual knowledge and the most intense stimulus to the general conception have arisen from a study of the thyroid gland in health and in disease. From an almost impossible chaos of ignorance and erroneous speculation, there has emerged in a few years a well-constructed working basis which, while no means completely satisfactory, yet offers the ward or laboratory worker a foundation on which to build a firmer structure. In the light of all that is known about

the pathological physiology of the thyroid it may seem strange to state that the normal physiology is far from being known. It is undoubted that the gland is necessary for proper health, and that its activity is in some way closely related to iodine metabolism, but beyond this we enter the labyrinth of theory. However, mere remembrance of cretinism, on the one hand, and of Basedow's disease, on the other, recalls striking pictures of conditions produced by hypoactivity or hyperactivity of the thyroid. That cretinism is caused by insufficient thyroid secretion is absolute, and that exophthalmic goitre is at least associated with too much of the same secretion is almost as absolute; and to-day medical science, accepting these two extremes as types, is attempting to clarify the mid pictures.

The object of this line of work being to make earlier diagnoses and more efficient treatment possible, it is not out of place briefly to review the results obtained in various places. Kocher, of Berne, whose opportunities have been unlimited, has been one of the most persistent advocates of the use of all means of study which will make the diagnosis of disturbance of the thyroid possible in the early stages, and his contributions have been classical. Properly to understand modern conceptions of the subject one must realize that in addition to the two extremes there exist many phases of disturbed activity, which may be due to too little or too much secretion or indeed to both. Starting with the assumption that in a well-developed case of exophthalmic goitre (or as the newer nomenclature would have it—hyperthyroidism) one finds goitre, tachycardia and other signs of trouble in the cardio-vascular system, nervousness, gastro-intestinal upsets, and eye signs, it is urged that the complete complex is by no means necessary for a diagnosis. The enlarged gland is always present, even though it may not be felt clinically; and this enlargement coupled with any one or two of the other symptoms should at least make the physician suspicious of the thyroid as the cause of the whole picture. In addition to the classical syndrome Kocher and others have added valuable diagnostic information in the form of careful blood-studies. It is maintained that in hyperthyroidism the differential blood count shows a distinct mononucleosis with a diminution of the polymorphonuclears. A further diagnostic point is offered from a study of the effect of iodine medication in cases of suspected hyperthyroidism: when the symptoms of such cases are actually caused by excessive thyroid secretion iodine medication invariably tends to increase the severity of the complaint. For this reason, it might be added, in passing, that Kocher has rigidly urged against such medical treatment except in the hyperthyroidism of puberty and other physiological states in which the en-

larged gland represents an attempt, on the part of the body, to compensate for the increased demands, and in which consequently iodine would assist Nature's efforts.

The relation of the thyroid to carbohydrate metabolism is still under study, but even now certain facts have been deduced which probably are of great practical value. It has long been known that some patients with Basedow's disease also had glycosuria, but the nature of the mechanism was not known. Now it has been shown that normally the thyroid has a stimulating action on the glycogenic function of the liver, and that in conditions of hyperactivity this stimulating effect may be overdone, thereby producing mellituria. However, it can be conceived that while the function may be overworked, it has not yet reached the stage of producing sugar in the urine, and this conception has been the basis for the so-called "sugar tolerance" test. A normal person can tolerate approximately 2 gm. of glucose per kilo body-weight, when given by mouth, without passing sugar in the urine; but the tolerance of a patient with hyperthyroidism would in all probability be more or less diminished. The test is extremely easy to perform, simply by weighing the patient and giving him in lemonade an amount of glucose equivalent to 2 gm. for every 2-1/5 lb. body-weight; then testing the urine voided three hours later for sugar. Of course, the condition of diminished tolerance for sugar exists in many diseases, and its presence is merely one of the many aids in forming an absolute diagnosis.

From the therapeutic standpoint, the importance of all studies leading to early diagnosis cannot be overestimated, for whether medical or surgical treatment be advocated success depends to a great extent on the amount of damage done the organism by the continued hypersecretion. Kocher and most authorities seem agreed that surgery offers the only rational cure to-day, but there are still those who urge *carefully controlled* medical attention in the way of complete rest, diet, and isolation. The success of the specific sera has not been as great in the hands of most physicians as it seems to be with the originators. It is not within the scope of this comment to criticize the various methods of treatment; we wish, however, to emphasize that no matter what method be followed, an early diagnosis is almost a necessity to success.

OPINION AND CRITICISM.

MENTAL CALISTHENICS.

Heinrich Heine, writing on the subject of the national traits of Englishmen, Frenchmen and Germans, says that the Englishman and the Frenchman are alike in this that they have a *present*, while the German has only a *past* and *future*. Now Mr. Arnold Bennett in his book, "Mental Efficiency,"* evidently coincides with the German poet; for according to his wise words, which are addressed to Englishmen, he dwells upon the present to the exclusion of all mention of the past and the future. And since Americans, by right of the language which they speak, belong to the great Anglo-Saxon family, we feel that it must be the present with us that is all-important, and that any divagation therefrom should be subjected to the corrective measures which Mr. Bennett would fain apply in the hope of its betterment.

To make the present worth while, Mr. Bennett advocates certain calisthenics for the brain, which, while not so severe as the gymnastics which enthusiasts apply to their bodies in the hope of emulating Lord Byron who wore "seven waistcoats, ran and played cricket till exhausted by excessive perspiration, and saw his ribs display Skin of no great Thickness and his clothes taken in nearly half a yard," are productive of much good. As can be readily gathered after reading the opening chapter, the mind is a very much neglected part of the human economy; for when inefficiency occurs,—that is when this important member of the body creaks and thereby shows it is out of joint,—scant attention is paid it. But it is an altogether different matter when the body gives evidence of too much lassitude, or too great an accumulation of fat, or the joints by their stiffness make plain that age must be fought off by Sandow-like strenuousness; then there is a mad rush to some "physical culturist" to learn the art of prolonging youth until the age of seventy. As the author pointedly puts it: "Will he remark with genuine concern that his mind is sadly out of condition and that he really must do something to get it into order? Not he. It is a hundred to one that he will tranquilly accept the *status quo*, without shame and without very poignant regret."

Now what treatment is advocated by Mr. Bennett to bring about the best results so that a mind, that has shunted its tracks, so to speak, through overwork, may get back to the normal status. When a muscle is overworked, the owner of it immediately thinks of rest as the best means for restoring it to its best estate; but though one would think that Mr.

*New York: George H. Doran Company. 1911.

Bennett would not be averse from applying the same therapeutic measure to an overworked brain, that is really not what he wishes should be done. Rest, according to him, is not to be scoffed at; but it is not rest in the ordinary acceptation of the word, but the taking of the mind, from its forced, monotonous pabulum that has been overstocking each and every nook, to the quietness of concentration on one very small matter and this not for any great length of time. "Twenty lines a week for six months: what a 'cure' for debility! The chief, but not the only, merit of learning by heart as an exercise is that it compels the mind to concentrate. And the most important preliminary to self-development is the faculty of concentrating at will," writes Mr. Bennett; and really when we physicians descend from our medical clouds, so heavy with theories, will our sanity not prompt us to say that perhaps after all this mere literary man is right?

But, be it understood here, Mr. Bennett is not posing as a psychiatrist or even as a literary psychiatrist, if there is such a thing. What he really is interested in is for the man of ordinary intelligence to get out of the present—again the Englishman, for which he should be congratulated—all that can possibly be extracted from that auspicious period in our existence. And just because he feels that, on account of a mental inefficiency that was brought on by ignoring the right calisthenics, the ordinary individual is to-day not getting what should be coming to him, he wishes to preach his new gospel. That it is a good gospel, goes without saying; for, unlike our medical socialists, he does not blame the conditions under which we live but the individual.

LITERARY NOTES.

The making of popular dictionaries at low prices is quite an industry at the present time; and from the number which are published at short intervals one would be justified in concluding that the demand is ever on the increase. Just what element in our communities is beseeching for new dictionaries in one volume is not known to us; but, judging from the contents and general make-up of the books we have seen, it surely is an element that is easily pleased. But an altogether different matter in the making of a dictionary is "The Concise Oxford Dictionary" published for the small sum of one dollar by the Oxford University Press, New York. Here one will find none of those objectionable crudities which show a distressing lack of scholarship; none of those glaring faults as to letter-press which are due, not only to carelessness, but to indifference on the part of the editors. If a dictionary is really needed by a physician, who would rather have the contents in one volume of some 1,000 pages than in two or for that matter eleven volumes of, say, 10,000 pages, he cannot possibly go amiss as regards this adaptation from the more voluminous "Oxford Dictionary." Although in one volume, the definitions have not

been shortened, but are given with the fullness characteristic of larger works. Again all those idiomatic phrases without which a dictionary falls short as a reference-book are presented without curtailment as well as are the roots in various languages. For instance, the word operation is defined thus: Working, action, way thing works, efficacy, validity, scope, (*is in, comes into, o.: its o. is easily explained; must extend its o., make it valid for longer time or in wider sphere*); active process, activity, performance, discharge of function, (*the o. of breathing, thinking, pruning, etc.*); financial transaction; (Surg.) thing done with hand or instrument to some part of body to remedy deformity, injury, disease, pain, etc.; strategic movement of troops, ships, etc.; (Math.) subjection of number or quantity to process affecting its value or form, *e. g.* multiplication. [OF. f. *L. operationem* (OPERATE,-ION)] This rather lengthy quotation should suffice to prejudice the student for this excellent work.

As the title would indicate, Dr. J. B. Hurry's "Vicious Circles in Disease" (J. and A. Churchill, London) is not intended for the specialist who regards the subject of the interdependence of the organs of such secondary importance, that mention thereof is construed into gratuitous advice, if not an attempt to degrade his lofty position to the lowly one of general practitioner. Now though the message of this excellent work will fall on barren soil, as far as the hidebound specialist is concerned, its purpose cannot be misunderstood by him who is neither specialist nor general practitioner—according to the conventional interpretation of these words—but the product of so wide a knowledge of medicine that when he happens to be in general practice, the keenness of his eye is that of a specialist, and when a specialist, the thought of following the tactics of a general practitioner is not abhorrent to him. Books like Dr. Hurry's, while they may not be epoch-making, are really more than ordinary textbooks, for they adumbrate what is bound to come in medicine just so soon as the specialist and the general practitioner work toward one end—namely, a closer alliance so that the greatest benefit will accrue to the patient.

The appearance, at the present moment, of the authorized English translation from the fifteenth edition of Dieulafoy's "Manuel de Pathologie Interne," which in English bears the title "A Text-Book of Medicine" (D. Appleton, New York), is of greater significance than would at first appear; for the author of this masterpiece of French scholarship in medicine is no longer among the living, his death having taken place in Paris on August 16th. A splendid figure, indeed, was Dieulafoy: splendid—and our readers must pardon the use of this rather extravagant word—since he combined all those qualities which go to the making of an undeniable

force. Combined with an urbanity that was typically Parisian, he had the courage of his convictions; and his candor and outspokenness, when it was a question of combating theories which were distasteful to him, went far in pleasing those who admire these enviable qualities when courtesy is not entirely divorced from them. A pupil of Trousseau, he followed in the steps of this master; but his originality did not allow him to deteriorate into a mere imitator, but made of him what was probably the brightest star in the medical firmament of the Paris of to-day. The book before us needs no high words of commendation, for everyone who reads medicine with intelligence knows its full value. It is the textbook of textbooks; and though others with some claims to superiority may attempt to crowd it off our shelves, we imagine the effort will be futile. In a work that is so full of things that are above the average, the task of singling out any one chapter is indeed a difficult one; but, if we were called upon to give advice to the reader, we would refer him to the pages on Diseases of the Brain, Typhoid Diseases, and Infectious Diseases Proper to Man. Here we have Dieulafoy at his best: his lucidity, his grace as a writer, his sureness of touch, his supreme mastery of the subject. The English translation leaves nothing to be desired; and though those who have read the work in the original might cavil at the failure of the translators to put into English the Dieulafoy manner of writing, the criticism is unjust, since this would be asking what is wellnigh impossible.

A book that should not be overlooked by bibliophiles is "Francis Bacon" by Dr. G. Walter Steeves (Methuen and Company, London), for the reason that unlike most biographies we have here in concise form the outstanding events in the life of the great philosopher. In most biographies of our literary worthies, the author injects his own opinions to so great an extent that we really read an account of his mental habit instead of the salient points in the life of the literary character who is supposed to be the subject of the book. Now no such charge can be brought against Dr. Steeves' work, since his manner of writing is the opposite of the personal sort that is so enamored of its self-opinionated pose that there is a constant blurring of the pen-picture. The matter of Bacon, the man, is really of secondary importance in this "Life"; a fact which we are glad to record, since, especially with American readers, the interminable controversy about his leniency in allowing one, William Shakespeare, to filch his glory seems to be all that is worth remembering. While Dr. Steeves' "Life" is not dedicated to the cryptographic enthusiasts who have wearied our most pleasant hours with their visionary talk, it would have been a stroke of genius to have done so; for in their eagerness to learn a new cryptogram they would have devoured the book only to learn that Bacon can really stand foursquare without the assistance of Shakespeare's plays.

As the readers of this column no doubt know, our sympathies do not lie with those physicians who cannot resist the itch of writing poetry. Now though our strictures have invariably been severe, they were prompted, not by malice, but by the thought that some severity might stem the ever-rising tide of the ambitious in the medical profession, who think it beneath them to speak in mere prose. If we have failed in our endeavors, some rejoicing should be ours at the present moment, for the volume which has recently come to us from the Riverside Press, Cambridge, bears witness to the fact that once in a long while a physician can write poetry that is worthy of the name. In "Verses From the Southwest" by Dr. Theodore Clarkson Merrill, there are many lines that are above the average, and a few that declare him a poet of insight and of that elusive touch that has the power of raising ordinary words to enviable heights. Of all the poems in this slender volume, "Easter Lilies" has appealed to us most, for here we have simplicity, rhythm, and the matchless grouping of words that could not be effected by anyone but an adept in their values. In its lack of redundancy, its directness and the *mot juste*, this poem does not fall far behind Paul Verlaine at his best.

While not a brilliant book, "Recollections of an Irish Doctor" by the late Dr. Lombe Atthill (Religious Tract Society, London) will hold the reader's attention to good purpose if sincerity, truthfulness and honesty are still the enviable qualities of mankind. A plain, unvarnished tale this book is; and though it is shorn of those frills and furbelows with which the usual autobiographer dearly loves to adorn his retrospective glimpses—the frills, somehow, foregather invariably around the author himself—it makes just the sort of reading every physician should indulge in if he wishes to see his every-day existence mirrored in a book. But should the physician still cherish romantic ideas of what the practice of medicine will yield him, he would do well to turn to some other book; for here are set down with charming candor all the exasperating obstacles which must be overcome ere a physician can achieve success. The fight Lydgate in "Middlemarch" made against narrow provincial ideas, only to be worsted by them, has its parallel in Dr. Atthill's autobiography, except that in the case of the Irish physician a dogged persistence was finally rewarded with some show of success. We, who know Dublin as it is to-day, can hardly realize what it was some seventy years ago and how deplorably deficient it was in abetting the aspirations of a young physician. To get at a realization of the municipal conditions, the chapters in Dr. Atthill's book on "Dublin Seventy Years Ago" and "Slow Progress in Dublin" are illuminating; and he who is dissatisfied with his lot at the present day would do well to con them carefully, if only to learn that while at present the physician has small chance of success until he is thirty, in those far-off days it was really at a much later period and after years of waiting that Fortune deigned to smile upon him.

ORIGINAL ARTICLES.

THE RÔLE OF THE MYOCARDIUM IN HEART DISEASE.

By LOUIS M. WARFIELD, M. D., of Milwaukee.

The more we have learned about the pathological physiology of the heart from the newer studies by means of venous pulse-tracings, cardiograms, and electrocardiograms, the more it is borne in upon us that the function of the heart muscle itself is what we wish to have most information about and what we know least about. Thus far we have no accurate means of measuring the actual power of the muscle, especially its ability to carry on the circulation against the odds of valvular disease, arterial disease, or disease of the muscle itself. We should like to be able to measure the tone of the muscle, but modern methods of research have yet to bring forward a means to do this with any degree of accuracy.

A normal heart muscle has five inherent properties: Irritability, rhythmicity, conductivity, contractility, and tonus. We are concerned with the two last, viz., contractility and tonus. By tonus we mean the force which resists over-dilatation of the muscle when the heart is in diastole. Normally the vagus nerve through the augmentor fibres controls this function of the heart muscle. When a normal heart is beating rapidly as the result of exercise, it, at first, dilates. If the exercise is not too severe, the transient dilatation soon passes away. The heart of the athlete or of one in training actually becomes smaller, that is, the tonus of the muscle increases following mild or even moderately severe exercise. The athlete's heart is often hypertrophied. It was formerly considered that there was no such condition as pure work hypertrophy, but experiments upon dogs which were made to run on a treadmill (Kuelbs) have shown that there is actually a true work hypertrophy.

It is extremely doubtful if the mere increase in the number of beats per minute could produce hypertrophy. Hypertrophy is generally conceded to result only after the muscle is stretched, and this takes place when the residual blood in the ventricle becomes greater than normal and acts as an increase in the load which the ventricle carries. Stewart (*Journ. Exper. Med.*, 1911, XIII, p. 187) produced such a condition in dogs by cutting the posterior cusp of the aortic valve with a MacCallum valvulotome. This caused a sudden insufficiency of the valve with a resulting excess of blood to the left ventricle at every diastole. To accom-

moderate this extra amount of blood the ventricle dilated. He found that the hypertrophy involved all the chambers of the heart with the greatest absolute and relative increase in the left ventricle. The auricles also hypertrophied to a relatively greater degree than the septum or the right ventricle. The co-hypertrophy of the auricles was not due to an altered venous pressure but resulted from increased force of the auricular systole. The heart showed increase in weight within one week after the production of the aortic insufficiency.

While a strong hypertrophied heart tends to decrease in size during exercise, the atrophic heart tends to increase in size or, in other words, to dilate. The auricles at first dilate enormously, later the ventricles. If, however, there is good tonus of the muscle, the ventricles in the normal heart do not dilate. A heart in which the muscle is diseased becomes dilated upon comparatively slight exertion.

Probably the most severe strain which one can place on a normal heart is the strain of lifting. The glottis is closed, the blood-pressure becomes greatly increased, the intrathoracic pressure rises, the veins of the head and neck stand out like cords, and excess of work is put upon the ventricle. In a healthy heart no harm is done. Exercise even to the point of exhaustion and fainting does not bring about cardiac dilatation in otherwise healthy men. Should the heart be diseased (fatty degeneration, myocarditis, etc.) not only dilatation, but permanent damage to the heart muscle may result from overstrain. In fatty degeneration of the heart there is diminished tonicity. This is one factor in producing permanent dilatation in such a heart.

The venous pressure is highest in exercise of strain and in straining at stool and during coitus. Frequently in the history of overstrain one or more of these factors are the first points noted. The high venous pressure keeps the heart dilated and the low tonicity of a diseased muscle permits the muscle to remain dilated. The most important point is repetition of the strain. Even a mildly diseased heart may recover from a considerable strain, provided the strain ceases at once or there is time for the heart to return to normal size before the advent of a second strain. But if the strain is repeated in a heart already dilated the tonicity is so low that permanent damage results. It would appear that the borderline between true heart failure and recovery from a strain depends upon the period of rest after strain.

The whole question boiled down to its last analysis is one of the integrity of the heart muscle itself. If the muscle is strong it will be able to stand enormous degrees of strain without becoming damaged. This becomes of greatest importance in the etiology of heart failure.

The conditions actually existing in the heart muscle and which cause it to dilate in response to overstrain and to remain dilated are not many. Pathologically there is parenchymatous degeneration due to the infectious fevers among which rheumatism and diphtheria stand pre-eminent. A

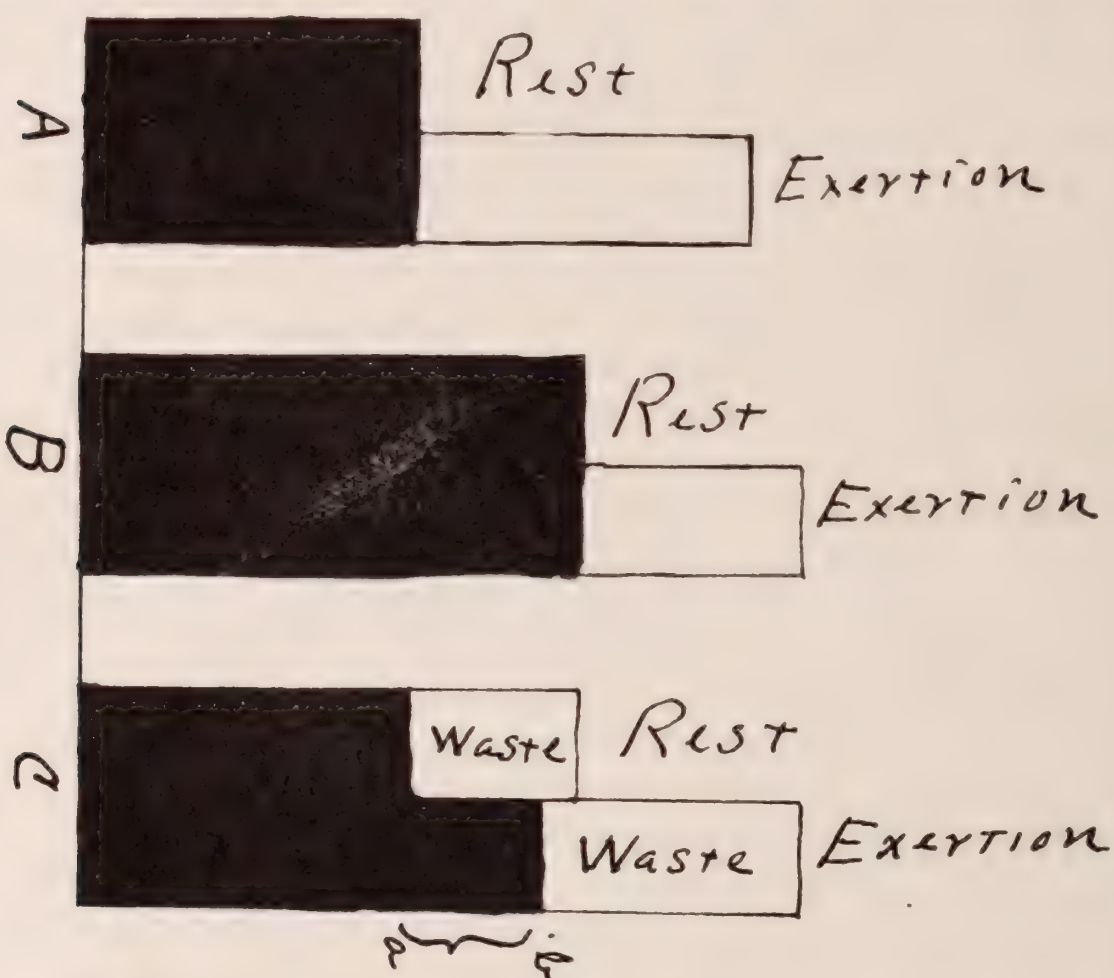
specific form of degeneration due to rheumatism has been described. Space will not permit of detailed description of the gross and microscopical appearances of cloudy swelling. Suffice it to say that it is the same in general as occurs in all the parenchymatous organs. The heart muscle necessarily, during the period of degeneration, is much weakened and subject to dilatation upon the least strain. Fatty infiltration is not a true disease of the heart muscle, but the fat may be deposited in such large amounts between the muscle-bundles as to produce pressure atrophy and replacement of some of the muscle cells by connective-tissue. This may not necessarily weaken the heart. On the contrary, it may be the means of adding strength to a heart which is embarrassed by too much fat. However, fatty degeneration is a true disease of the muscle characterized by destruction of the individual cells and replacement of the cells by fat droplets. A certain amount of connective-tissue also is deposited throughout the heart. A heart with this condition is weak, although it may do its work for a long time, never giving cause for suspicion that it is diseased until some slight strain is placed upon it.

Fibrous myocarditis is probably the commonest disease of the muscle, the one oftenest responsible for permanent dilatation. This may follow repeated strain as in chronic nephritis, arteriosclerosis, overeating, hard manual labor, etc. It has been shown that the hypertrophy which practically always is found in such hearts is first due to an imbibition of water by the individual cells. The cells also elongate but do not seem to increase in number. With the increase in size of individual fibres there goes hand in hand destruction of other fibres, and connective-tissue deposits take the place of the atrophied and destroyed cells. Some believe that continued strain leads to a replacement of the edema in the muscle by connective-tissue. Such changes have been found in the heart of experimental adrenalin myocarditis (Pearce, Fleischer and Loeb). It has been held that the deposition of fibrous tissue was due to anemia caused by contraction of the coronary arteries and consequent failure of the blood-supply. Fleischer and Loeb (*Arch. Int. Med.*, 1909, III, 78; 1910, VI, p. 427) in a study of experimental myocarditis produced by the injection of spartein sulphate and caffein sodium benzoate together with adrenalin, believe that the myocarditic changes in the heart are due to excessive contraction of the muscle-fibres of the heart and not due to the contraction of the coronary vessels. The lesions are almost invariably and always most advanced near the auriculoventricular ring in the left ventricle and in the tips of the papillary muscles where the strain is greatest. They also find that hearts showing such myocarditic changes on macroscopic examination were functionally inferior to normal hearts, when placed under conditions in which a surplus of work is required. This only bears out what has long been known clinically and proved at autopsy.

Finally, the heart may be weakened by actual atrophy of the organ due to decrease in size of the fibres and a degeneration of the cells in which granules of hematoïdin are deposited in a fusiform arrangement

around the nucleus. Normally there are a few granules at each pole of the nucleus. The heart so atrophied has a muddy brown color, the muscle is flabby, it is functionally exceedingly weak. The condition is known as "brown atrophy."

Weak hearts often develop peculiarities of rhythm. The inherent properties of the muscle are interfered with and we find intermittence, irregularity, and extra contractions. On the venous tracings are found all grades of irregularity up to fibrillation of the auricles. The pulse-tracings may show *pulsus alternans* and *pulsus irregularis perpetuus*. These occur only in severe permanent damage to the heart muscle. Extrasystoles are frequent. These mean damage to the muscle, although



Hirschfelder has observed a case of a young athletic man in whose pulse-tracings there were frequent extra-systoles. Fr. Mueller (Harvey Lecture 1906-1907), however, thinks that so frequently do we find heart failure or arteriosclerosis develop in later years in those who showed in their youth extra-systolic irregularity, that this probably was but a stage of evolution in those diseases and therefore is not insignificant.

Hearts, the subject of valvular lesions, are not necessarily weak hearts. So much stress is laid on valvular lesions during one's student days that one is apt to get the impression that a valvular lesion dooms the man, who has it, to an early grave. Lesions at the several valves naturally have different effects upon the functional power of the heart. And of

great importance is the distinction upon which Prof. Osler lays such stress, that of endocarditic origin, meaning the lesion following infectious diseases particularly rheumatism, and that of arteriosclerotic origin following progressive thickening of the valves and marked myocardial fibrous deposits. The prognosis in the former type is much better than in the latter type.

Valvular lesions in general only affect the heart in that they force the heart continually to do more work in order to maintain the circulation than the normal heart has to do. The normal heart has a wide range of flexibility and great reserve power. The heart with a valvular lesion is always encroaching upon its reserve power so that while it may actually be a more powerful heart, as in aortic insufficiency, its range of reserve power is really less than that of a healthy heart. This may be graphically shown in the accompanying chart.

The important point to bear in mind is that it is not the valvular lesion which determines the breaking down of the heart but the state of the heart muscle. It is not to be understood that hearts with valvular lesions are in any sense as strong as normal hearts. They are not as strong and they break down under strains which would not affect a normal heart. The very fact that there is a valvular lesion means almost invariably that the myocardium is more or less diseased, and it is upon that myocardium that the individual with the lesion in his heart has to depend for the functional power of his heart. The rôle of the myocardium then assumes the very first place in the pathology and pathological physiology of heart disease.

Valvular lesions are so obvious, as a rule, when the heart is examined that they focus attention upon themselves and one is apt to forget the fact that the muscle is also affected. They serve as a sign-post to warn of dangers ahead. Unfortunately, when only the myocardium is diseased, we have no means of knowing it until some accident occurs which causes symptoms of heart failure. Many a person is going around and doing his or her daily tasks with a much diseased heart muscle. We have no means of diagnosing it unless the person comes to us for some other complaint and we test out the muscular power of the heart under conditions which in a normal heart would produce no dilatation. Actual symptoms of heart failure are the first indications we have that an individual has a weak heart.

When the heart becomes unable to maintain the circulation regularly, one side or the other giving way under some extra load, there is stasis of blood. This condition is known as "broken compensation." This may be of two kinds, really of three kinds: (1) Broken compensation of the left ventricle; (2) of the right ventricle; (3) of both ventricles. Necessarily the symptoms vary with the side of the heart which fails. If the right side fail the symptoms reveal stasis in the systemic circulation. Should the left side fail to do its work the blood collects in the lungs and symptoms referable to those organs manifest themselves.

Broken compensation does not occur in a normal heart however severe the exercise may be. Even hearts with evident valvular lesions do not break down except temporarily, provided the muscle of the ventricles is not diseased. One may lay down the axiom that broken compensation is dependent upon excessive strain placed upon a heart whose muscle is the seat of pathological changes which have weakened the muscle.

The normal heart muscle is capable of becoming acutely dilated on frequent occasions. This fact is known to all who have ever had occasion to examine boys and young men following violent exercise. The pulse may be so rapid that it is impossible to count it. Nausea and vomiting may occur or the person may faint from the exertion. So far as we know such overstrained hearts return, after a time, to normal size by virtue of the tonicity of the heart muscle, and no permanent damage results. The essential difference between a heart with a normal musculature and one with diseased musculature must ever to be kept in mind.

We have as yet no means of diagnosing failure of the heart muscle until it actually fails. Time and time again are we surprised at autopsy to find the heart muscle so full of myocardial changes, macroscopically, and so many fibres ruptured and atrophic, microscopically, that we wonder how such hearts could have carried on the circulation competently. The explanation is that such a heart was not called upon to perform any work beyond its powers. We cannot diagnose myocarditis in such a heart except by reasoning from autopsy findings. Again there are mild grades of breathlessness on exertion and slight oppression beneath the precordial region, which are indications that the heart cannot carry even a small extra load without becoming dilated and causing some stagnation of blood. Severer grades show dyspnea, cough, pain over the liver, swelling of the feet, scanty urine, fluid in the serous cavities, etc. Examination shows that the heart is dilated, the rhythm is gallop, canter, or embryocardial in type. The rate is intermittent or irregular or both combined, and venous pulse-tracings may show a positive venous wave synchronous with the contraction of the right ventricle or a fibrillation of the auricles. Various means have been devised from time to time to measure myocardial changes. It is safe to say that the best authorities do not consider them of any great value. Reliance is based on symptoms which the patient shows after mild exercise rather than on measuring, with instruments, blood-pressure, pulse-curves, foot-pound power, etc. "The only true numerical criterion of cardiac efficiency is whether a given strain causes it to diminish in size (increase in tonicity=stimulation) or to dilate (decrease in tonicity=overstrain," Hirschfelder). The mechanism of heart failure is too subtle to be caught on graphic records. The sensations of the patient are much more valuable indications that the heart has failed to do its work.

From what has been said above, it becomes evident that the myocardium plays the chief rôle in disease of the heart. Valvular lesions mean that

the heart is working at a disadvantage, its reserve power is not as great, but it does not necessarily mean a weak heart. It seems to me that there is more than a fine distinction here. It means that every case of heart disease, that is, valvular heart disease must be studied carefully as a distinct entity and not as one of a group of cases having similar lesions. It is just here that there is the important difference between the really good physician and the average doctor. Habits of life such as eating, sleeping, mental work and worry, defecation, sexual excesses, drinking, and, in short, everything pertaining to the life of the patient must be most carefully and painstakingly inquired into before we can even begin to tell him what not to do. No detail is too unimportant for study. When we have grasped the fact that there are no unessentials in the history of a person with suspected heart failure, and the fact that a loud murmur does not necessarily mean real heart disease, and the other important fact that the state of the myocardium controls the situation, then we may have hopes of assisting many apparently hopeless invalids to useful lives.

PROLONGED PREGNANCY.

By ADAM H. WRIGHT, B. A., M. D., of Toronto,
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This short article is intended as a sequel to a paper on "Induction of Labour at Term as a Matter of Routine," published in the *American Journal of Obstetrics* two years ago. Since that time observation of cases, consultations, and conversations with fellow-practitioners have given me more definite opinions as to the evils of prolonged pregnancy.

The following recommendations were made in the paper referred to:—

Induce labor in all cases within two or three days after the expected date of confinement without waiting for any signs of labor.

First plug the vagina according to the Schauta method, making a special effort to pack the vault tightly.

After packing allow the patient to get up and go about if she wishes.

Remove the tampon in twenty-four hours, introduce a new plug and again allow the patient to get up, and go about if she chooses.

Remove the second tampon in twenty-four hours after its introduction.

If by this time labor has not commenced it is generally advisable to pass a bougie into the uterine cavity before introducing the third tampon.

A few remarks will now be made in reply to criticisms and certain questions which have been asked. For the purposes of our present argument we shall consider the results in a pregnancy prolonged one month after term.

First, as to Child.—The growth of the child in utero after it becomes viable is very rapid. At the end of seven months the average weight is 1,400 grm.; at the end of eight months, 2,200 grm.; at the end of nine months, 3,470 grm., the increase in the latter month being nearly 58 per cent. The probable increase in the tenth month is 2,000 grm. In other words a child weighing seven pounds at term will weigh eleven at the end of another month. A child weighing nine pounds will weigh thirteen or fourteen pounds. In addition the child loses to some extent its flexibility; "universal flexion" is not so marked; worse still, the head becomes hard because of ossification.

We cannot speak so definitely as to the effects on the mother. We may say, however, that her nervous system is more or less seriously affected, she is frequently much depressed, and her general health is impaired in many ways.

The difficulties we meet in conducting the labor are always great—sometimes tremendous. The large ossified head neither moulds nor flexes properly.

In a large proportion of cases the occiput turns to the rear. The uterine contractions are unduly painful, and unsatisfactory in many ways. They commonly become weaker or cease altogether just at the time when the expulsive forces are required. Interference is generally necessary, and the results are frequently, if not mostly, disastrous for both mother and child.

Such evils are generally recognized, but many think that it is not right to subject the patient to the risk involved in the induction of labor unless grave dangers arise. The gravest danger is really the growth of the child in the uterus; and this we should not fail to appreciate, although we cannot see it. If the induction of labor is done in an aseptic way it is practically devoid of danger. In any case it involves much less danger than a labor when a pregnancy has been prolonged to ten months.

One of the objections raised is that we cannot always tell when the patient has reached "term." For instance, there may be evidence to show that conception has occurred, not shortly after the last menstrual period, but a little before the next period should have commenced. In such a case, or in any case of doubt, the accoucheur may obtain evidence by both external and internal examination which may assist him in arriving at a correct conclusion. If the matter still remains doubtful it may be well to wait for one week before inducing labor. It is safer, however, to induce labor one or two weeks before "term," than two weeks after.

Many questions have been asked about methods of procedure. The Schauta method of vaginal tamponade is not effectual in a large proportion of cases. Such being the case it seems better in the majority of cases to introduce a tube or bougie into the uterine cavity as the first step. The parts should be prepared as for vaginal hysterectomy. The patient is usually placed in the lithotomy position—"across the bed"—in private practice. A "weight" speculum is introduced, and the cervix is fixed with a tenaculum forceps. A sterilized gum elastic bougie (No. 12 English) is introduced gently within the uterus up to the fundus if possible, care being taken not to rupture the membranes. If membranes are accidentally ruptured, little harm will result if the vault of the vagina is at once tightly packed. Little, of Montreal, uses a medium-sized rectal tube with a flexible metal director; and finds this sufficient in all cases, while the smaller gum elastic bougie alone sometimes fails.

In my own practice I always use the vaginal tampon after the bougie is introduced. There is generally about an inch of the bougie in the vagina below the cervix. The patient is turned from the back to the Sims position, and the Sims speculum is introduced in such a way that the vagina is "ballooned." The gauze (medicated generally with iodoform) is introduced, and packed tightly over or round the small portion of the bougie projecting into the vagina. The bougie is quite flexible, and the portion below the cervix is generally turned at a right angle while the gauze is being introduced. The aim is to pack very tightly the vault and upper two-thirds of the distended vagina. If the lower third is tightly

packed it causes great pain, and frequently retention of urine. During the last few years I have used ordinary cheese cloth instead of gauze, for reasons which do not apply to our present argument. The material is cut into strips, four and a half inches wide and four yards long. One of these strips is usually sufficient for one packing; but occasionally a little less or a little more is used. This strip represents one half square yard, i. e., a piece of cheese cloth one yard long and half a yard wide.

The material (5 per cent. iodoform cheese cloth) is prepared as follows by Miss Margaret Lash, of Toronto:—

Take four yards of cheese cloth (good quality) twenty-seven inches wide. Tear (not cut) into strips four and a half inches wide and full length. Sterilize these strips and then boil in sterile water. Wring them as dry as possible (having hands covered by sterilized gloves) and thoroughly saturate them in the following preparation—

Eight ounces of a one per cent. solution of carbolic and sterilized water.

Enough castile soap to make a suds.

Three drams and one scruple of iodoform powder.

Mix thoroughly in sterilized basin with sterilized pestle or glass rod.

After thoroughly saturating strips, wring as dry as possible.

Pack gauze strips, one after another, into sterilized glass jars, and seal down while moist.

In some cases as before mentioned, the vaginal tamponade is sufficient to induce uterine contractions, and bring on labor. In all cases it appears to have a good effect in dilating and softening the vagina, the pelvic floor and the perineum.

I may say incidentally that in dry labors my custom now is to introduce the tampon as soon as possible after the rupture of the membranes. For such a purpose the cheese cloth is also better than gauze, because it is more likely to keep the liquor amnii, or a portion of it within the uterine cavity.

Another question frequently asked is this: Do you often find that introduction of the bougie, and especially of the tampon, produces pain? Yes, it frequently does; and I often desist, and get an assistant to administer an anesthetic—preferably ether. In such a case I always introduce both the bougie and the tampon.

Does protracted pregnancy frequently occur? So far as we can judge from the statistics of those who have investigated the matter it would appear that it occurs in about 15 per cent. of all pregnancies. Protraction to the extent of four weeks, or one month after term, probably occurs in 6 per cent. of the cases when there is no interference.

Is it still deemed advisable in all cases to induce labor, at or shortly after full term? As to this question, I shall speak now for myself alone. Careful observation and increased experience have fully confirmed my opinions expressed two years ago. I think, therefore, that it would be well, for both mother and child, to make it an ordinary matter of routine to induce labor in all cases within a few days after term.

APPENDIX DYSPEPSIA.

By WILLIAM FITCH CHENEY, M. D., of San Francisco,
Clinical Professor of Medicine, Medical Department Stanford University.

Disturbance of digestion is an ancient story. Always it has played a large part in the sufferings of humanity; and to-day there is no more frequent complaint than "stomach trouble." Our fathers in medicine were inclined to blame the stomach for all disturbance of its function; and the laity still prove their own belief in this old doctrine by taking dyspepsia remedies for all their digestive ills. Old textbooks on medicine taught that the stomach was the proper point of attack, when the patient complained of "a want of appetite, squeamishness, sometimes a vomiting, sudden and transient distentions of the stomach, eructations of various kinds, heartburn, pains in the region of the stomach, and a bound belly," as Cullen wrote in 1787. Old dogmas die hard; but gradually a new doctrine is receiving acceptance—namely, disturbance of stomach-digestion is not always the stomach's fault. This teaching is comparatively recent. It was suggested many years ago, but it is only during the last decade that progress has been made toward its spread. Indeed, the past five years have seen more advance than any that preceded; and to-day medical science takes the position that dyspepsia is not an entity; that it simply presents a group of symptoms produced by numerous different causes; that its treatment must always be preceded by careful investigation of the whole body; and that frequently some other organ than the stomach is the real offender, even when the symptoms are wholly gastric. Furthermore, in any case of chronic, persistent dyspepsia it may also be taken for granted that functional disturbance is only a consequence of definite organic disease somewhere, and that there is no such thing as a primary gastric neurosis. This is the present-day teaching, and increasing experience seems to justify it.

Much dyspepsia is undoubtedly due to disease of the stomach itself—to ulcer, to cancer, to gastritis, to weak walls, to obstructed outlet, to inefficient glands. But all this is now an old story, well proved and generally accepted. A more recent chapter is that which tells of dyspepsia due to diseased gall-bladder or ducts; or to ulcer in the duodenum; or to some cause entirely outside the digestive tract, such as pernicious anemia. And now most recent of all, we have the assertion that dyspepsia is frequently due to chronic appendicitis. To be sure, this had been suggested by various individuals in different parts of the world—in France, in Germany and in America—previous to 1910. But it was in January, 1910, that

Moynihan* published his paper entitled "Remarks on Appendix Dyspepsia," which first called general attention to the subject. Moynihan claimed that the symptoms of both gastric and duodenal ulcer could be imitated, even to the production of hematemesis, where no pathological change was discoverable at operation except chronic inflammation of the appendix; that removal of the inflamed appendix was followed by cessation of all the symptoms, sometimes at once, sometimes only by degrees; and that no operation for supposed gastric or duodenal ulcer was complete until an examination had been made of the appendix. He called attention also to the fact that there are several types of appendix dyspepsia beside that resembling ulcer; explaining the gastric symptoms as due mainly to a protective pylorospasm.

During February, 1910, this paper called forth numerous letters, written to the journal that had published it, some of them condemning, some of them approving the new doctrine. Bowlby,** another English surgeon, objected that Moynihan's description of appendix dyspepsia was so vague that there were few people with flatulent dyspepsia who would not be included in it; that the symptoms described as characteristic were so diverse as to practically demand removal of the appendix for all dyspeptics; that Moynihan's case-reports were too few and the interval since his operations too short to justify conclusions as to final results after previous years of abdominal trouble. Sir Clifford Allbutt,† while expressing the "natural apprehensions of the physician lest there be nowadays some over-readiness in our surgical colleagues," felt it quite likely that Moynihan's views might explain some obscure cases of dyspepsia; and gave the history of 2 cases under his own observation, where gastric symptoms, long persistent, ceased permanently after removal of diseased and adherent appendix. Ewald†† called attention to the fact that as far back as 1899 he had described cases which he named "appendicitis larvata," in which dyspeptic complaints were due to diseased appendix. "In the course of years," he wrote, "I have observed quite a number of such cases in which I made the diagnosis, had the operation done, found my diagnosis confirmed and saw a prompt cure." W. Hale White,‡ while admitting the possible relation between diseased appendix and gastric symptoms, thought we should be slow to conclude that because a diseased appendix is associated with particular symptoms, it is the cause of them; and referred to cases under his observation where following removal of the appendix the dyspeptic symptoms remained uninfluenced or returned after a lapse of time as severely as ever. Other contributors of less prominence than those mentioned likewise discussed Moynihan's views in their letters, and numerous case-reports were thus brought out, most of them confirming the statements in the original paper.

**British Medical Journal*, January 29th, 1910.

***British Medical Journal*, February 5th, 1910.

†*British Medical Journal*, February 12th, 1910.

††*British Medical Journal*, February 12th, 1910.

‡*British Medical Journal*, February 19th, 1910.

In March, 1910, two more valuable papers on the subject were published in London, one by Paterson, a surgeon, and one by Fenwick, a physician. Paterson's article* was entitled "Appendicular Gastralgia; or the Appendix as a Cause of Gastric Symptoms." Like Moynihan he expressed the opinion that appendix disease may give rise to symptoms which closely mimic those of gastric and duodenal ulcer; and that latent appendicitis is a frequent cause of gastric hypersecretion and acid dyspepsia. He believed that the symptoms were the result of intestinal toxemia, due to intestinal stasis; or to a reflex influence of the diseased appendix upon gastric secretion. As a surgeon he laid down two important rules derived from his observations: (1) That no operation should be performed on the stomach except when a definite organic lesion of the stomach or duodenum was found, because gastro-enterostomy never cures appendicitis; and (2) that in all operations for supposed gastric or duodenal ulcer the condition of the appendix should be carefully investigated.

Fenwick's paper** was entitled "The Clinical Significance of Gastric Hypersecretion and its Connection with Latent Disease of the Appendix." He reported 112 cases operated upon for continuous gastric hypersecretion, which he divided into three groups: those due to ulcer or its scar on one or the other side of the pylorus; those due to gall-bladder disease; and those due to chronic appendicitis. In 22 cases out of the 112, disease existed in the appendix alone; in 5 there was coexistence of gastric ulcer and diseased appendix, and in 4 coexistence of duodenal ulcer and diseased appendix. In these latter cases Fenwick believes that the appendix disease is primary; that this induces the continuous flow of a hyperacid gastric juice; that this in turn excites severe inflammation of the stomach and is very liable to be followed by hemorrhagic erosions and ultimately by ulceration in stomach or in duodenum.

In the United States, as might be expected, the most valuable contribution on appendix dyspepsia has come from Mayos' clinic. In March, 1910, a paper by Christopher Graham and Donald Guthrie† was published on "The Dyspeptic Type of Chronic Appendicitis." This is based upon a review of 200 cases of chronic appendicitis in which stomach symptoms predominated. 115 of these had been operated upon a year or more before the report and their subsequent condition had been followed. 89 were found to be cured by the operation and their dyspepsia had never returned; 7 were very much improved; 13 were improved but still had occasional return of symptoms; while only 6 showed no improvement at all. In June, 1910, Munro of Boston,†† writing on "Dyspepsia and Indigestion Viewed from a Surgical Standpoint," also referred to the dyspepsias due to chronic appendicitis. His conclusion was "there is a type of dyspepsia most naturally ascribed to gastroduodenal ulcer,

**Lancet*, March 12th, 1910.

***Lancet*, March 12th, 1910.

†*Journal of the American Medical Association*, March 19th, 1910.

††*Boston Medical and Surgical Journal*, June 23rd, 1910.

but which is really secondary to an appendicitis and which is curable to a degree not yet definitely determined by simple appendectomy."

When we see how many different observers, working independently in different parts of the world, have thus reached similar conclusions regarding the existence of an appendix dyspepsia, we are forced to the belief that this condition must hereafter be reckoned with as one of the possibilities in all chronic disturbances of digestion. Several important questions at once present themselves for consideration. *First*, is there any typical clinical history from which it may be suspected that chronic appendicitis is the cause of the gastric symptoms? As a matter of course such clinical history must concern itself (a) with the digestive complaints and (b) with the evidence of appendix inflammation.

(a) As regards the dyspeptic history, it becomes clear from a study of the papers heretofore mentioned, that there is no one definite picture presented in all cases. Moynihan in his original paper called particular attention to the striking resemblance of many histories to that of gastric ulcer; the symptoms being pain soon after food, epigastric in location; flatulence and belching; sour eructations; nausea and frequent vomiting; even hematemesis at times. He says: "The typical gastric ulcer of the medical textbooks, in my view, is frequently the appendix." Paterson likewise calls attention to this resemblance between gastric ulcer and appendix dyspepsia. Graham frankly states: "In the early days many of these cases were operated upon by surgeons in general for ulcer of the stomach, and while no lesion was found in the stomach, a needless gastroenterostomy was performed for the so-called medical ulcer, which operation brought the patient trouble rather than relief."

In other cases the history is that corresponding to hyperchlorhydria: persistent heartburn, water-brash, flatulence, nausea, but without pain or vomiting or hematemesis. This group is undoubtedly a common one; but as hyperchlorhydria does not often produce symptoms severe enough to lead the patient to submit to operation, the source of the trouble is not so frequently demonstrated as in the supposed cases of gastric or duodenal ulcer. It seems probable that many of the persistent cases of "sour stomach," resisting all forms of medical treatment, are due to chronic appendicitis with adhesions. In not a few instances this has already been proved by operation which revealed the appendix condition; by the cure of all symptoms following removal of the appendix, and by the return of the gastric secretions to normal after such operation.

The following case may be taken as fairly typical of this group of appendix dyspepsias. In April, 1909, a woman aged thirty-three sought advice for stomach trouble which she had had for two years past, worse recently than ever before. She had an abnormal appetite, was hungry constantly, and had a gnawing ache in the stomach whenever it became empty, particularly about four o'clock each morning. Taking food relieved her for a couple of hours, but then the pain returned and persisted

until the next meal. It was always most severe at night when there was no food in the stomach. She felt nauseated often but never vomited; and suffered much from bilious headaches. The bowels moved regularly each day. Excessive tenderness was found in the epigastrium on pressure and a succussion splash constantly, but no peristaltic wave, no dilatation, no evidence of food retention. The test-meal showed a total acidity of 56, practically all made up of free and combined HCl. Over the appendix region a small mass was palpable, the size of a hen's egg, but not particularly tender, freely movable, gurgling on pressure. After a year of diet and medical treatment the patient was no better. She was then persuaded to have the inflamed and adherent appendix removed, immediately thereafter lost her dyspepsia and it has never since recurred.

In the third group of cases the complaint is of heaviness and fullness and discomfort soon after eating, with flatulence and belching and frequent regurgitation of mouthfuls of food during digestion; and of inability to take as much food as desired, because the stomach soon feels overdistended. These cases may show a normal stomach analysis or a sub-acidity; and seem to be due not so much to secretory disturbance as to pylorospasm. Moynihan mentions such cases in his report. The writer has also observed one case of this sort. A woman, aged forty, complained she had had stomach trouble off and on for twelve years, but had been fairly well until a year before. Since then she had much bloating and fullness after food; also, while she had no pain after eating, within five minutes, no matter how much or how little was taken, the food began to come up in mouthfuls. This happened after every meal, but as a rule only a few mouthfuls came and then no more; though exceptionally this would go on for hours. It was not water-brash but solid food that was regurgitated, without nausea or any effort at vomiting. The bowels were persistently constipated. This patient never showed any evidence of organic disease in her stomach—no tumor, no tenderness, no dilatation, no food retention, no peristaltic wave; and though numerous analyses were made, the secretion was always practically normal. But at the first examination and all subsequent ones a mass was palpable in the appendix region, not tender to touch as a rule, but always causing discomfort when handled. Medical treatment of all sorts did no good. Even the rest cure, on the theory that the dyspepsia was neurotic, made no change whatever in the symptoms. Finally after several months the abdomen was opened and the appendix removed. It was found bound down and buried by adhesions throughout its entire length. Following this procedure the old symptoms at once disappeared; and though more than a year has now elapsed, the patient has remained perfectly well.

(b) As regards a history that definitely points to the appendix as the seat of disease, it is not always to be obtained. But previous vague attacks of abdominal disorder may have had more significance than was attributed to them at the time. Both Moynihan and Graham refer to the

importance of an early history of so-called "belly-aches" in childhood or youth, which were really appendix inflammation and laid the foundation for subsequent dyspepsia; and the so-called "bilious attacks" of later life, with headache, vomiting, languor, malaise, and sharp abdominal pain, set down as acute indigestion, Moynihan thinks are often really attacks of atypical appendicitis that leave adhesions or other obstruction of the lumen. Another point brought out both by Graham and Moynihan is that the pain in the epigastrium and the other symptoms of gastric indigestion in appendix dyspepsia are either excited or increased in severity by exertion or exercise, such as hard physical work, long walks, golf, or dancing. Such a history is contrary to that in ulcer or hyperchlorhydria, where exercise usually gives relief. Sometimes when no history whatever can be elicited of any previous acute abdominal attack, there is nevertheless complaint of occasional aching and soreness and tenderness in the appendix region for a day at a time, though never severe enough to put the patient to bed. Graham also recalls the often observed fact that after an acute attack of appendicitis, leading to prompt operation, the patient is frequently relieved of a long-standing dyspepsia whose cause was never previously understood.

Secondly, we have to ask whether there are any typical findings on physical or laboratory examination that aid in the recognition of appendix dyspepsia. Although the symptoms are entirely gastric, the physical examination gives none of the signs usually found in organic disease of the stomach, except epigastric tenderness, which may or may not be present. There is no tumor visible or palpable; no peristaltic wave indicative of pyloric obstruction; and no decided change in contour after inflation, such as is found in prolapse or dilatation. Investigation of stomach contents after a test-meal gives variable results. Hyperacidity is common; but on the other hand the acidity may be normal or subnormal. Fenwick says that chronic hypersecretion is a frequent finding, as shown by the presence of hyperacid juice in considerable amounts in the fasting stomach in the early morning. But there is no food retention to indicate organic obstruction at the pylorus and no excess of mucus as in chronic inflammation.

With this comparative lack of evidence of organic stomach disease, there is on the other hand more or less evidence presented of trouble with the appendix. In the first place, there may be a palpable mass there, rolling freely under the examining hand, tender on pressure; or there may be simply extreme tenderness without palpable thickening; or when pressure is made at McBurney's point, the patient may complain only of pain in the epigastrium, or of epigastric distress and nausea. Even when chronic appendicitis is present, it is possible that no local signs may be elicited; or that they may be discovered at one examination and not at another; so that the failure to find them does not eliminate the presence of a diseased appendix.

Thirdly, the question naturally follows, Is it possible to so combine history and physical signs as to diagnose dyspepsia due to chronic appendicitis? Of the first importance is a careful clinical history; of past illnesses as well as of the present one, for so a clue may be obtained as to whether appendix attacks have preceded. In all digestive disturbance more is to be learned from the character and sequence of the symptoms than from physical examination; and time taken to collect and to arrange the details of the patient's story is time well spent. Surgeons who have seen appendix dyspepsia most frequently, as Moynihan, Paterson and the Mayos, all agree that the clinical picture most often resembles that of gastric ulcer. It is in cases of apparent gastric ulcer then, that this possibility should always be remembered and the appendix carefully examined before operation is done or before medical cure is instituted for ulcer. Even if treatment by rest and restricted diet removes all symptoms for the time, it does not follow that the pathology was in the stomach; for such treatment would also relieve the strain upon an inflamed and adherent appendix. There are points too in the clinical history of ulcer that ought to differentiate it from the other forms of chronic indigestion, if the case is carefully studied. Such are the long duration and the alternation of periods of distress with periods of comfort; the onset of the symptoms of pain, distress, sour eructations, nausea and vomiting one to four hours after food; and the relief afforded by taking food or drink or alkalies. Graham emphasizes these latter points particularly. He says it is not the chronicity of the indigestion that is peculiar in ulcer, it is not the degree or location of the pain, nor the occurrence of vomiting, gas, sour eructations or burning discomfort in the stomach; these details are common to many types of chronic dyspeptic trouble—gall-stones, appendicitis, cancer; but the characteristic point is the time the pain appears, with its accompanying symptoms of vomiting, gas and sour eructations; its regularity after meals; and its control by food, vomiting and alkalies. In chronic appendicitis, on the contrary, the time of onset of pain is irregular. It usually appears soon after food and often is present continuously, regardless of food, though in the epigastrium, and not over the appendix. There is not the definite regularity of symptoms after every meal; and nausea, distress, flatulence and distension are more common than severe pain. Finally, the symptoms in chronic appendicitis are not controlled by taking food, which usually disturbs rather than relieves; while vomiting is not so constant and does not give ease if it occurs; and alkalies have no effect at all. But after all is recalled about these fine points in differential diagnosis, it will be well to remember also the rule laid down by Paterson—"in all operations for supposed gastric ulcer, the condition of the appendix should be carefully investigated."

In his original paper Moynihan asserted that hematemesis might be due to chronic appendicitis, with no gastric ulcer present or other usual

pathology to account for it. Nine years previously W. Hale White* had published a paper referring to numerous instances not only in his own experience, but also in that of other British physicians and surgeons, in which a diagnosis of ulcer of the stomach had been made, in which hematemesis, gastric pain and vomiting had occurred, but in which no ulceration had been found at operation although the stomach was opened and search made; and he had asked the question, "Are not some patients said to be afflicted with gastric ulcer really suffering from a different disease?" Moynihan makes the statement that in perhaps a dozen of his cases there had been hemorrhage from the stomach in excess of a pint; where operation revealed no lesion whatever in the stomach or other pathology than that in the appendix. Paterson likewise admits the possibility of hematemesis and melena as symptoms entirely due to appendix dyspepsia; while Fenwick goes still further and claims that continuous gastric hypersecretion, whether induced by chronic appendicitis, by chronic gall-bladder disease or by the scar of a healed ulcer in stomach or duodenum, may cause minute hemorrhagic erosions, capable of producing alarming hematemesis, without any visible break in the continuity of the gastric mucous membrane. Other explanations offered to account for hematemesis in chronic appendicitis are sepsis, or embolism of an artery in the stomach wall, or toxic influences which we do not at present understand. However it may be caused, there is so much testimony accumulating as to its possibility in appendix dyspepsia that the occurrence of hematemesis can no longer be considered as speaking for gastric ulcer in the differential diagnosis between the two. As a corollary to this it follows that occult blood in the feces is also of no aid in differentiation, nor the Einhorn thread test; for tiny erosions, weeping blood, may give the feces reaction or discolor the thread, as well as an open ulcer.

One case of hematemesis apparently due to chronic appendicitis has already been observed in San Francisco. Dr. Chas. G. Levison** reported before the Cooper College Science Club, in April, 1910, the history of a young woman who throughout four years had several times vomited blood profusely. A diagnosis had been made of ulcer, because of apparently typical symptoms besides that of hematemesis and she had once had a course of diet for ulcer, but without cure. Finally Levison operated, finding no ulcer or other lesion of stomach or duodenum, but chronic appendicitis with adhesions, for which the appendix was removed. At once the dyspepsia and hematemesis ceased; and up to this date, as is learned from a personal communication, there has been no recurrence and the patient has remained perfectly well.

Fourthly and finally, how does removal of the appendix cure the gastric symptoms? It has been claimed by skeptics that the cure is the result simply of suggestion; that the dyspepsia is neurotic and that the removal

**Lancet*, June 29th, 1901.

***California State Medical Journal*, February, 1911.

of the appendix has not so much to do with ending the symptoms as has the psychological influence of the operation itself. This explanation of the cure has been discussed by Ewald, who refuses to accept it for the following reasons: (1) None of the patients coming under his observation were hysterical; they had become nervous from prolonged suffering, but could not be looked upon as being from the beginning hysterical or neurasthenic persons; (2) suggestive effects are never of long duration; they may be surprising but they do not last; while in his cases the cure was permanent, in some of them continuing after as much as ten years; (3) there are patients operated upon for typical attacks of appendicitis, who besides complain of pains not due to the appendix, and in such persons the latter complaints remain after operation, depending on coincident disease elsewhere.

It seems perfectly clear to those who have observed cases, whether few or many, that the removal of the dyspepsia is directly due to the removal of the appendix; and a rational explanation for this is not hard to find. The chronic inflammation in the appendix leads to adhesions that bind it down to the cecum; or to obstruction of its lumen so that its cavity contains concretions or thick, offensive, purulent fluid. The presence of these abnormalities leads reflexly to protective spasm of the pylorus or to a continuous hypersecretion of gastric juice; and the removal of the cause produces a cessation of the effects. Within the last few years physiologists have proved conclusively that the various parts of the gastro-intestinal tract are mutually dependent one upon the other; and it is not surprising that disease of one part such as the appendix, should have an influence upon another such as the stomach. Let us then have faith when reason gives so good a basis for it, and in the future let us not hesitate to diagnose appendix dyspepsia when the evidence warrants, or to advise operation when diagnosis is made.

FURTHER OBSERVATIONS ON HIGH FREQUENCY CAUTERIZATION OF BLADDER LESIONS.*

By E. L. KEYES, JR., M. D., of New York,Professor of Genito-Urinary Surgery in Cornell University Medical College.

Since the publication of a preliminary paper upon the treatment of bladder tumors by the high frequency current a year ago, it has been found that the single pole, or Oudin current, is far more efficacious in the treatment of these lesions than the D'Arsonval current, which I was using at that time. The superior efficacy of the Oudin current is due to the greater convenience of its applications in the bladder, and, perhaps, also, to a superior electro-therapeutic quantity. The precise mode of action of these currents is nevertheless still so much a matter of dispute that it seems preferable, as it is certainly practicable, to discuss the matter as though the electricity produced a simple burn.**

Technique.—The apparatus required is a cystoscope with ureter catheterizing connections, also an electric generator for the production of the high frequency current, and an insulated wire sufficiently small to pass through the ureter catheter channel.

The instruments which I have employed are made by the Wappler Company. Judging from personal experiments with other apparatus, and from experiences related by others, it is evident that certain instruments for the production of high frequency currents are not suited to this work. This failure is said to be due to the relatively high voltage as compared with the amperage, and to relatively slow oscillation of the current.

The insulated wire is cut short off at the end which is to be introduced into the bladder. From the opposite end the insulation is removed to a sufficient extent to make the necessary connections with the generator. It is my usual practice, for reasons to be explained later, to employ a cystoscope with channels for two ureter catheters, introducing a wire into each. The current to be employed should be produced with almost the smallest possible spark gap at the generator. A large spark gap, by increasing the voltage, causes unnecessary pain and excites within the bladder so violent a destruction of the epithelium in contact with the wire as to obscure the field unnecessarily by the production of epithelial detritus and hemorrhage. Moreover, it shortens the duration of the operation by rapidly burning off the insulation of the wire.

The patient is prepared for cystoscopy in the usual way, the cystoscope

*Read before the Twenty-fifth Annual Meeting of the American Association of Genito-Urinary Surgeons, New York, June 2nd, 1911.

The case reports have been completed to July 1st, 1911.

**Beer (*Annals of Surgery*, August, 1911) has fully discussed this part of the subject.

introduced, the tumor inspected. Then one of the wires is projected against the tumor and pushed into it. In this manipulation the end of the wire may be lost sight of among the villi of the growth, but this is a matter of no moment. The current is then turned on for a brief space and the patient asked whether he feels it. If the wire has slipped from among the villi and come in contact with the bladder wall, or if there is a short circuit anywhere, the patient will feel pain; but if the wire is solely in contact with the tumor no pain is felt.

The current is then turned on and if the point of contact between the wire and the tumor has remained in the field of vision, one sees a rapid blanching of the tissues at that point, accompanied by a throwing off of what appears to be epithelial dust and many bubbles; and if the cystoscopic illumination is turned off one can often see a glow or even a spark at this point of contact. In case the end of the wire has disappeared from the field of vision, the fact that the current is working may sometimes be established by turning off the electric light and looking for the glow that arises from the spark at the end of the wire.

The duration of the burning is limited by several factors. In the first place, by the patience of the patient, or, if this is very great, by that of the operator. In the second place, by the fear of burning the bladder wall, when only a small bit of the tumor remains to be removed. In the third place, by the destruction of the insulation of the wire itself, for the heat of the current burns the rubber and if this goes on too long, the operation is brought to a close by leakage of electricity either through the water in the bladder or by short circuiting to the cystoscope. If a long spark gap is employed this short circuiting may burn out the cystoscopic lamp, but with a properly adjusted spark gap I have not had this accident.

A further difficulty due to burning off of the insulation is the fact that withdrawal of the wire may peel off a piece of the insulation, which drops into the bladder and may prove a nucleus for stone. This may be avoided by carefully lowering the lever (when an indirect vision cystoscope is used) and withdrawing the wire and telescope together, as one piece. The loose insulation will then fall naturally into the cavity at the end of the telescope and will be withdrawn with the wire. This precaution is only necessary when the cauterization has been prolonged and the wire is out of sight, so that its condition cannot be ascertained. Even if the insulating rubber does fall from the wire, a bladder that empties itself may be depended upon to eject it spontaneously.

In order to avoid all these difficulties, it is preferable to use the wire with the strongest insulation (this is one made of multiple strands of copper), and to make each burn of no more than thirty to sixty seconds' duration. After this an interval of a few seconds will cool the wire somewhat, when the cauterization may be repeated in the same spot or in a different spot. If the tumor does not bleed and is in plain view, one can thus go from

place to place on its surface until the whole of this has been reduced to a white mass with charred spots upon it where the actual contact with the wire has taken place. If the insulation of the wire softens during this process, one shifts to the wire in the opposite ureter catheter channel. When manipulating difficult tumors, i. e., those that bleed, or that overhang the urethral orifice, or that fall between the end of the telescope and the wire, the utmost dexterity may be required to obtain satisfactory results. In such cases one may sometimes derive much help by pushing the tumor away with one of the wires and then burning it with the other. In such instances, also, a systematic covering of the ground is quite impossible. One must burn more or less haphazard.

The frequency with which one may safely repeat these burns depends chiefly upon the condition of the patient. Inasmuch as the operation usually has to be repeated several times, it is well to make every effort at the time of the first cystoscopy to obtain very satisfactory anesthesia and to acquire the patient's confidence by stopping the burning or withdrawing the cystoscope at his slightest request.

I have usually repeated the burnings at intervals of two weeks, for the reason that almost all my cases have been charity cases and I have not been able to spare the time for a more frequent application. I have found, however, that for most cases an interval of a week is ideal. Twice a week is rather frequent for a cystoscopy, and at the end of seven days the line of demarcation between a burned spot and an unburned spot is sufficiently clear to show one where to make one's next burn. Complete detachment of the slough takes from two to four weeks.

The treatment has produced only the following accidents:—

(1) Detachment of the insulation.

(2) A single case of very severe hemorrhage which subsided after two days' rest in bed, without any other treatment, and which occurred a week after a rather prolonged burn.

It is the rule that no hemorrhage occurs after the first burning with the exception of such slight bleeding as is excited by the application itself. Occasionally slight hemorrhages have appeared some days after the burning, but with the one exception noted, they have been entirely unimportant, exception made for the infiltrating carcinomata.

(3) A third condition, which can scarcely be called a complication (and which has been noted by both Dr. Beer and by Dr. McCarthy) and was depicted in the illustrations of my preliminary paper last year, is a curious reaction of the bladder wall to the irritation of the current. The mucosa swells up in such a way as to simulate an infiltrating carcinoma. Several weeks' intermission in the burning will suffice for the subsidence of this.

Effects of the Treatment.—The results obtained from this treatment in papilloma of the bladder have been most gratifying. The effect of the current upon infiltrating carcinoma is apparently nil. I have tried the

treatment by the method suggested by Dr. Beer upon two cases of prostatic hypertrophy with no result. Three cases of bladder ulceration have also given unsatisfactory results (one improved, two unimproved). I have been rather disappointed in the effect of this method of treating the engorged verumontanum.

In considering the details of my results which follow, pray bear in mind that until within the last month my source of electric current has been an ancient machine which is manifestly far inferior to the one I am at present using, and, furthermore, a great many of the treatments have been given partly by way of demonstration, which interferes greatly with the thoroughness of one's work, so that with a modern machine and no distractions one may expect to obtain cures very much more rapidly.

I have treated by this method every case of papillary tumor seen by me since October, 1909. There were twelve papillary tumors, three of them multiple. Of these cases, two are still under treatment; one was turned over to another physician for the completion of the treatment (he having loaned the case, as it were, up to the time that he obtained an instrument himself). One other eloped after three treatments.* The others, eight in all, with thirteen tumors, have been cured. The cures of individual tumors have been verified nineteen months after (Case I); one year after, two tumors (Case V); ten months after (Case VI); nine months after (Case II); seven months (two tumors in Case II, and one in Case VII). Thus three cases have been verified a year or more, and five others from seven to ten months. On the other hand, two very small tumors (Case IV) that were burned but once were found by another physician to have relapsed nine months after this burning.

The duration of cures in these cases is brief, to be sure, yet sufficient to justify the hope that every papillary bladder tumor should be submitted to this form of treatment before operation is contemplated. It is, of course, impossible to distinguish the presence or absence of induration in the base of a papillary tumor seen through the cystoscope, and many of the tumors treated by me have suggested carcinoma; while in one (Case II), the diagnosis of carcinoma was made by a pathological examination although the tumor looked like a small papilloma. The question of malignancy of bladder growths is one that cannot be discussed here.

We have classed all our cases as papillomata although, no doubt, many of them would be classified pathologically as carcinoma. On the other hand, several cases of bladder ulceration by neoplasm with infiltration of the bladder wall, palpable by rectum, seemed to be benefited in no way by this form of treatment.

CASE REPORTS* (PAPILLOMATA).

Case I.—Male, forty-four years of age, had hematuria intermittently for fourteen months. I cystoscoped him in July, 1909, and discovered a large papilloma on the right side of the bladder and subsequently removed this through

*She has since reported herself well, but refuses cystoscopy to prove this.

a suprapubic incision. In September a relapse was noted by cystoscope. He was burned with the D'Arsonval current five times, the last time on November 6th, 1909. Since that time he has been cystoscoped on a number of occasions, the last time on June 1st, 1911, and no evidence of relapse has been seen.

Case II.—Male, sixty-one years old, hematuria intermittently for two months when first seen in August, 1909. A small tumor was seen near the right ureteral orifice, and this was removed through a suprapubic incision. In November the cystoscope revealed a small relapse in the scar; meanwhile a pathologist had reported carcinoma, but clinically the tumor always remained benign. The tumor was burned four times, the last time on April 23rd, 1910. When last cystoscoped, on January 28th, 1911, no relapse had occurred in the scar, but in May, 1910, three small villous tufts had appeared near the vault of the bladder on the lateral wall. I destroyed two of these by one burn as verified seven months later. The third I was uncertain of and did not burn until January 7th, 1911 and once thereafter. On October 5th, 1910, a small villous growth was seen on the upper wall of the urethra at the entrance to the bladder. I burned this and burned it again twice in January. Since then the patient has refused to be cystoscoped and has had no further symptoms.

Case III.—Male, aged seventy-eight years. Has had hematuria intermittently for eight years. Cystoscope shows bladder so full of tumor and bleeding so readily that satisfactory examination is impossible. He was burned once with the D'Arsonval current and ten times with the Oudin. Two weeks after the last burn he was reported by his physician to be dying of uremia.

This patient was reported by me as having died, but he turned up again six months later with the statement that his bleedings had been very slight during that time but had again become continuous for the last two weeks. He had received three more burnings during the month of June, but his bladder is still so full of papilloma that I am still unable to state whether the tumor is single or multiple.

Case IV.—Male, aged thirty-three; intermittent hematuria one year. A sister died of cancer of the bladder. Cystoscope revealed four tumors, a large one just to the left of the left ureter orifice, two small tufts along the urethral-vesical ring, and another small tuft in the vault. The large growth was burned twice with the D'Arsonval and six times with the Oudin, at the end of which time it was almost destroyed, and the case was turned over to the physician who had sent him, and who has since completed the cure. Meanwhile I apparently destroyed the three small tumors with one burn each, but two of them relapsed nine months later and were destroyed by further cauterization.

Case V.—Female, aged sixty. Single hematuria. Rather small tumor which ultimately proved to have a double base, growing from the left side of the bladder just beyond the ureter orifice. Burned once with the D'Arsonval and four times with the Oudin current, the last time June 16th, 1910. Cystoscope shows that she remains healed, June 1st, 1911.

Case VI.—Female, aged twenty-five. Hematuria and urethrorrhagia constantly for one week. Cystoscope reveals a tumor two cm. in length behind the left ureter. Burned twice with the Oudin current. Last burn, June 3rd, 1910, and cure verified by cystoscope April 12th, 1911.

Case VII.—Male, aged thirty-seven; tubercular hip since youth. For eleven years has urinated frequently and during this time has had six or seven hemorrhages. Urine very purulent. Cystoscope reveals an enormous tumor growing from the bladder neck and very difficult to burn owing to bleeding and because it falls so close against the cystoscope. Burned with the Oudin current 12 times, the last burn in November, 1910, at which time the bladder was much inflamed, but apparently free from tumor. The cure was verified by cystoscopy on June 8th, 1911.

Case VIII.—Male, aged forty-nine. Frequency of urination one year. Hematuria eight months. Cystoscope shows a large papilloma filling the right side of the bladder and extending beyond the middle line both above and below. Burned fifteen times. The tumor has apparently been cured, but cure has not been verified.

Case IX.—Female, aged twenty. Frequent and painful urination and pus in the urine for one year. No hematuria. Cystoscope reveals many papillæ growing from the trigone. The tumor was burned three times and the patient then eloped. (See text.)

Case X.—Male, aged forty-six. Intermittent hematuria for fifteen years. Cystoscopy shows a large papilloma to the right of the trigone; burned six times, the last time June 12th, 1911. Cure not yet verified.

Case XI.—Male, aged fifty-two; hematuria two months, intermittent and profuse. Cystoscope shows a bleeding papilloma just back of the left ureter. A single burn on June 16th, 1911, almost completely destroyed the tumor as was verified by an examination a week later, at which time a single papillary tuft was burned. Cure not verified.

Case XII.—Male, aged fifty. Profuse hemorrhage one month. Cystoscope revealed a bleeding papilloma just behind the trigone. Burned June 27th, 1911.

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METHODS OF DEALING WITH THE SAC IN OPERATIONS FOR THE RADICAL CURE OF INGUINAL AND FEMORAL HERNIÆ.

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There is reason to believe that the ordinary indirect inguinal hernia is always to this extent congenital, that a sac lined with peritoneum persists after the descent of the testicle is accomplished. This was the opinion of R. Hamilton Russell,¹ R. W. Murray,² Wm. Sheen,³ W. T. Bull⁴ and others; and while their theory has met with some opposition, it is coming into more and more universal favor. It is not intended here to review their arguments. The paper of Mr. Russell in particular is so convincing and the evidence adduced against him so very feeble that most of us will be content to regard the discussion as closed.

Let us grant then that the sac of an inguinal hernia exists in all cases from birth and awaits only some extraordinary exertion or some relaxed condition of the parts to receive a loop of bowel from above. This then is the accident which calls the patient's attention to his condition and brings him to the surgeon. In dealing with hernia, therefore, the obliteration of this sac must always be insisted upon as the one all important step in the operation, and indeed some have even maintained that, if this is successfully accomplished, all reconstructive procedures, all reinforcing of the abdominal wall and narrowing of the rings by means of sutures, may be considered superfluous as the bowel will not come down when there is no sac to receive it.

Acting upon this assumption Russell reports that in operating upon children he limits his procedures always to the simple removal of the sac; and in a series of 143 cases has not experienced a greater number of relapses than occurs in the practice of his colleagues who employ a more elaborate technique. In adults the conditions are slightly different as the tissues have now assumed their permanent character and relations, and the rings are generally somewhat dilated from the long continuation of the hernia. Therefore, it would seem wise to attempt some reconstructive operation, and few are likely to advocate the employment of Russell's technique in dealing with older patients. Kocher,⁵ however, comes very near to doing so and careful examination of his method may even convince us that he practically does do so. Kocher exposes the fascia of the external oblique but does not split it. He then frees the sac from the cord at the external ring; grasps its free end in a long pair of

forceps and inverts it, pushing the forceps along the canal as far as the internal ring. Here he nicks the aponeurosis of the external oblique with a knife and delivers to view the point of his forceps carrying the end of the sac. The sac is now drawn forcibly forward, tied off as high up as possible and removed. At this point, however, Kocher appears to have some misgivings as to the sufficiency of so simple a procedure; for he now tightens the aponeurosis of the external oblique by means of a single row of sutures each including about an inch in its grasp, so that when these sutures are tied this inch is drawn together and laid down as a dense fascial mass over the canal. It is difficult to see just what advantage this offers over an initial splitting of the aponeurosis, but Kocher claims a permanent cure in 92.5 per cent. of all cases and will allow the second best method (the Bassini) but 89.8 per cent. of enduring results.

Kocher is loud in his claims for the simplicity and reliability of his method and its infliction of a minimum of trauma upon the tissues. It has, however, one great fault. It is a compromise. If the simple removal of the sac is sufficient for a cure, why pass a row of sutures through the intact external oblique? or if sutures are to be passed through it, what good reason is there why it should not be split to begin with and a view obtained of the subjacent structures? Then if the conjoined tendon is found widely retracted, as it is likely to be in many herniæ of long standing, especially where a heavy truss has been worn, it may be brought down and sewed to Poupart's ligament either above or below the cord as seems best at the time, and how this can militate against the permanency of the result it is indeed difficult to understand. It must, however, be admitted that bad technique may here give rise to a strangulation of the cord and that the danger of infection consequent upon increased trauma is somewhat greater than under the Kocher method.

However, the point to be emphasized is the tremendous importance of the sac in the etiology and pathology of inguinal hernia and the success of those operators who rely mainly upon its complete extirpation for cure.

Of femoral hernia much the same is to be said. Russell is uncompromising. He asserts that the sac in all cases of femoral hernia is a congenital anomaly. Murray supports him. Their arguments and their array of evidence are very convincing, and so far as I have been able to discover nothing of much weight has ever been brought forward to oppose them. E. M. Corner⁶ has something to say on the other side, but appears to us to have been successfully answered. And, if the sac here plays the same rôle as in the case of inguinal hernia, all will agree that its complete removal must here also be the all-important step in procedures looking to a cure.

Bearing the above in mind it is somewhat surprising to discover how little has been written on the subject of dealing with the sac in operations

both for inguinal and femoral hernia. A careful review of the French, German and English literature of the past five years reveals but three or four papers which bestow any considerable amount of attention upon it. Confining ourselves for the present to inguinal hernia, we find that surgeons have vied with each other in devising ingenious modifications of the Bassini operation and other similar procedures, but in their zeal for reconstructing the canal and strengthening the anatomy of the parts have diverted their attention somewhat from what is after all the crucial point—namely, the care of the sac. Many, probably most, content themselves with simple removal after firm ligation, leaving the ligated neck free at the internal ring. This is exactly what Kocher does, and the impossibility of any other mode of disposition under his technique is another objection to his method. Bull appears to have done the same, as also does Russell, and indeed it seems a safe assumption that ninety per cent. of all surgeons follow a similar practice. And, yet, is it not obvious that this ligated neck forms a point of least resistance in the peritoneum? Scar-tissue is going to form here and scar-tissue is weak tissue. But a more important consideration is the following. What surgeon can be absolutely sure that he has always applied his ligature at the very uppermost limit of this peritoneal process which we call the sac, and has not left still half an inch or so which remains above as a little pouch, or at any rate a relaxed area of peritoneum—a potential pouch, ready to become a pouch as soon as pressure is exerted upon it from within? Recurrences after operation do occur and, though we possess no final information as to how the new sac is formed, it would nevertheless appear highly undesirable to leave this point of least resistance in the peritoneal investment of the abdomen to press directly against the orifice of the internal ring inviting the abdominal pressure to force it through. How much more reasonable it would appear to draw it upward and fix it securely behind the heavy muscles of the abdominal wall. Here at least it would be out of mischief, virgin peritoneum would slide up to take its place over the orifice of the internal ring, and should our hernia recur, it would at any rate have to form an entirely new sac for itself of which it would find not even the rudiments prepared.

The point is not a new one. Macewen appears to have perceived it when he devised his operation, but his method is difficult and dangerous. DaCosta⁷ describes it as follows: "The bowel is reduced and an incision three inches long is made in the direction of the inguinal canal, the centre of the incision corresponding to the external ring. The sac is freed from its attachments below and is lifted up. The surgeon introduces a finger into the inguinal canal and separates the sac from the cord and from the walls of the canal, and then carries the finger through the internal ring and separates the peritoneum for one inch about the periphery of this aperture. A chromicized catgut stitch is fastened to the lowest portion of the sac and is passed through the sac several times so that pulling

on the stitch will purse the sac. The free end of this stitch is passed through the internal ring into the belly, and is pushed out through the abdominal muscles one inch above the internal ring, the skin being pushed aside so as to escape perforation by the needle. The thread is tightened so as to fold up the sac and pull it into the belly. This plugs the ring. The sac is permanently anchored by taking several stitches in the external oblique muscle." This reads as if the aponeurosis of the external oblique were not to be divided, but the successful carrying out of the procedure would certainly involve such division, and a little further on we read that the conjoined tendon is to be sewed to Poupart's ligament, which

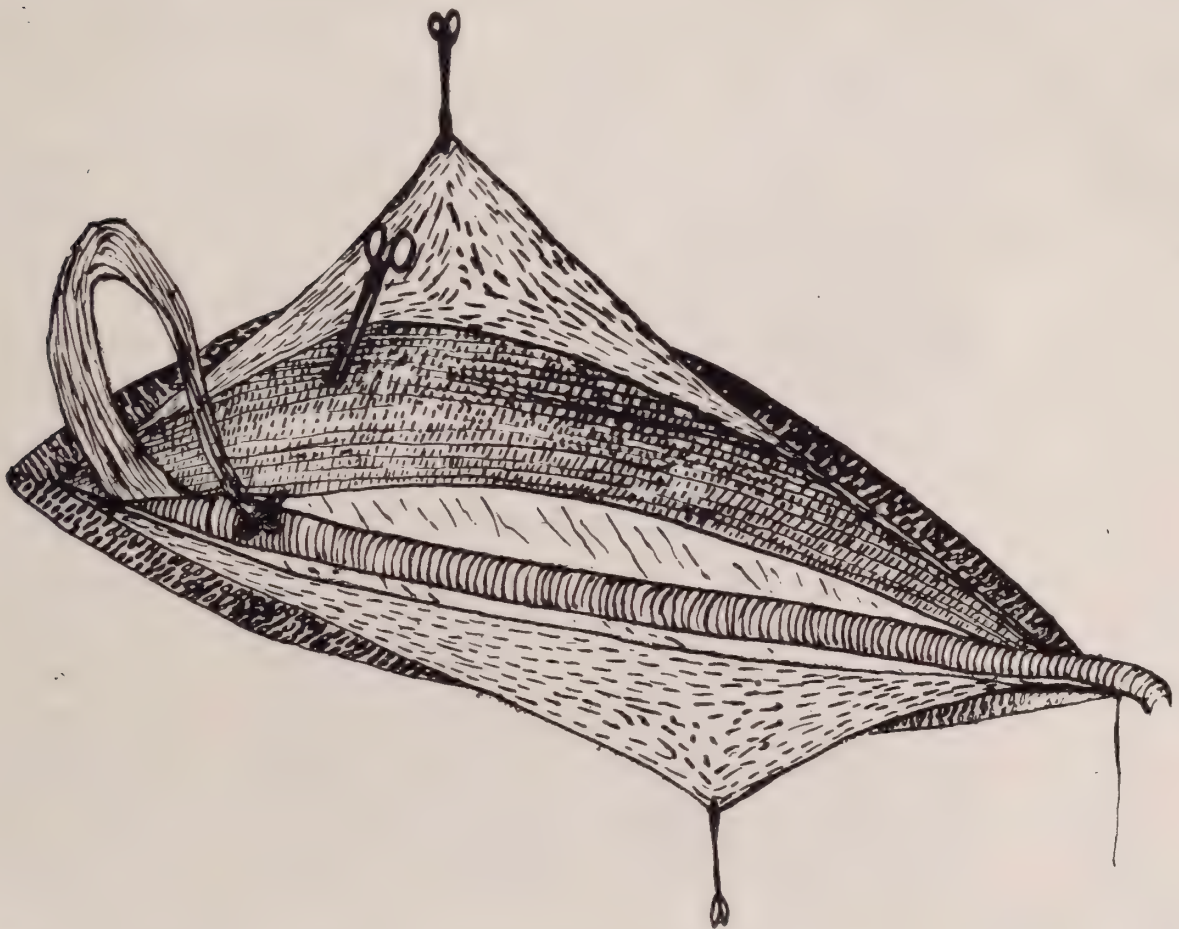


Fig. 1.—Lexer's method of dealing with the sac in the operation for the radical cure of inguinal hernia.

could certainly never be accomplished if the external oblique remained intact. But, granted that the internal ring was fully exposed, what are we to say of the introduction of a needle through it into the abdominal cavity and the pushing of this needle forward an inch above through the abdominal wall, guided only by the finger? That this could be successfully accomplished no one will question, but most surgeons will certainly regard it as an unnecessarily awkward procedure. We like to work openly where we can see what we are doing, and manœuvres carried out through very narrow orifices in dark cavities must always have their attendant dangers. As for the plugging of the ring with the redundant portion of the sac, few outside of its originator have ever appeared to

defend it. If the ring is too large we can narrow it with a stitch down to any size he may choose, and there can therefore be no excuse for plugging it with tissue that is here foreign and likely to become necrotic. Macewen has had few followers, and his leaving of the sac after strangulating it with his suture may be discarded, but he does deserve credit for his idea of pulling the neck of the sac upward away from the mouth of the internal ring; and it is certainly to this feature that his operation owes any success which it may have achieved.

It remained for Lexer⁸ to give us a method whereby the same result can be accomplished without the necessity of invading the peritoneal cavity, and by a method which is simple, effective, and free from danger. He divides the skin and the aponeurosis of the external oblique in the usual way and frees the sac as far up as the internal ring where he ligates it securely as high up as possible, but does not yet remove it. He now passes a pair of slightly curved forceps under the free margin of the conjoined tendon, insinuating them gently upward between the muscle and the peritoneum for a distance of about two inches. Here he pushes the point of the forceps forward through the muscle. Into the jaws of this forceps he now introduces the jaws of a second pair of similar forceps, locks them securely and withdraws the first pair, thus conducting the second pair along the route of the first down toward the internal ring.

The situation is now that shown in the illustration. The loose end of the sac is now clasped in the jaws of the forceps which have been thus placed, and the forceps withdrawn. This brings the sac out through the muscular tissue at a point about two inches above the internal ring. It is pulled upon until the neck of the sac or point of original ligature comes to lie firmly against the posterior surface of the muscle at this point, a thing which requires no great amount of force as the peritoneum is but loosely attached in this region and slides upward very easily. Two or three sutures now anchor the sac to the muscle and the redundant portion of the sac is cut away. The Bassini operation may now be performed or any other procedure resorted to which the requirements of the case may seem to indicate.

This procedure appears to offer all that can be required of an ideal method of eliminating the sac. It is done entirely extraperitoneally and is so simple that it adds practically nothing to the difficulty of an ordinary herniotomy. One performing the operation in this way for the first time is surprised at the ease with which the ligated neck slides up to its new position. There seems to be no resistance whatever, and, should it occur to anyone that a possibility of tearing the peritoneum may lurk as a remote danger, he has but to try the method once to dispel his misgivings. Indeed, the first resistance encountered is the absolute one arising when our point of ligature impinges against the posterior surface of the muscles, and indeed it is this resistance which tells the surgeon that he has accomplished his purpose and may proceed with his sutures. The time required is but an additional minute at most.

The amount of laceration inflicted upon the muscle, by the thrusting of a pair of forceps through it, is of course negligible, and even granted that a portion of the sac remains penetrating the muscle, I think no one will see any danger from this source especially when it is considered that the aponeurosis of the external oblique, which has been drawn upward during our manœuvre, falls when released completely over the area involved. Should the surgeon however wish to avoid the drawing of the sac through the muscular tissue, he may proceed somewhat differently as I have seen done by Dr. W. T. Coughlin, of St. Louis. Having ligated the sac he leaves the end of his ligatures long and threads each upon a needle. He then removes the sac. He passes an additional suture

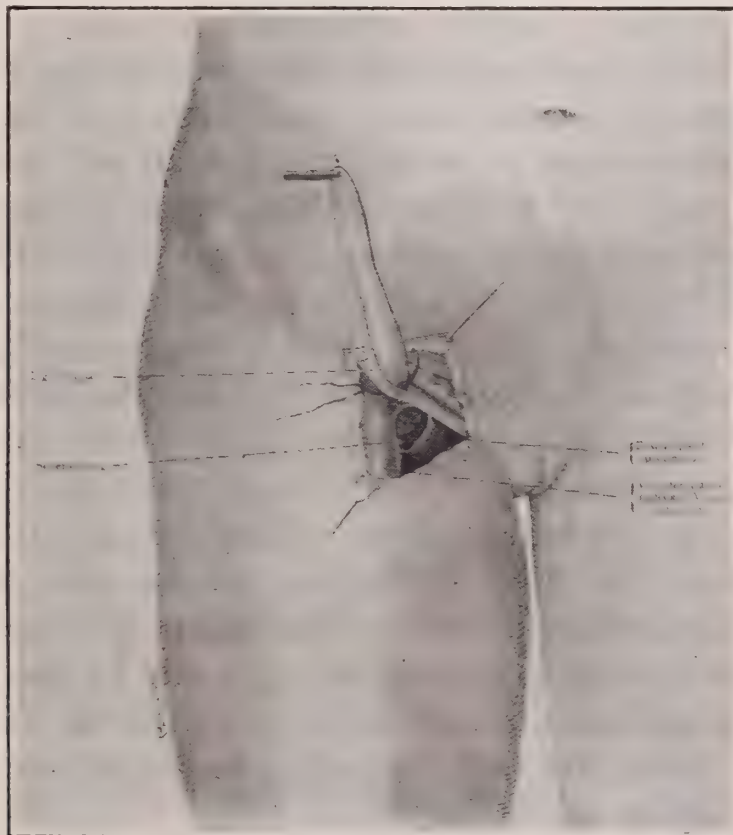


Fig. 2.—Kocher's method of dealing with the sac in the operation for the radical cure of femoral hernia. The needle is shown passing through Poupart's ligament which would anchor the neck of the sac in its new position. His illustration shows this technique, but he expressly repudiates it in his text, saying that this needle should pass through the sac alone. We would suggest the propriety of performing the operation as shown above.

through the neck of the sac, and again threads each end upon a needle. Now he inserts a finger under the free margin of the conjoined tendon and dissects it bluntly from the peritoneum for a distance of about two inches, at which point he passes his needles through the muscular tissue from within outward, in such a manner that his knots when tied shall lie in a direction parallel with the muscular fibres and about a centimetre and a half apart. The tying of these knots now draws the neck of the sac firmly up against the posterior surface of the muscles precisely as is done when the Lexer method is employed.

Paparvannou⁹ suggests a similar procedure. He likewise, having ligated and removed the sac, leaves the ends of his ligature long and threads each upon a needle. He then separates the conjoined tendon from Poupart's ligament for a distance of an inch or more above the internal ring in the direction of the anterior superior spine of the ileum. At this point he passes one needle through the muscle and the other through Poupart's ligament. When the two ends of the suture are now drawn tight, the neck of the sac is pulled away from the mouth of the internal ring for a distance of about an inch outward along Poupart's ligament. A firm knot completes the technique.

This would appear to be a less desirable disposition than that of Lexer, for the reason that it leaves the neck of the sac in a somewhat weaker position. It is probably, however, sufficiently secure.

In dealing with femoral hernia, the principles are the same. The neck of the sac should not be left at the inner orifice of the femoral canal but should in some manner be drawn away from it and securely anchored. To do this we have only to make an adaptation of Lexer's method as already described for inguinal hernia. The procedure will be as follows. Having isolated the sac and reduced its contents, ligate it as high up as possible, but do not yet remove it. Pass a long curved pair of forceps alongside the neck of the sac upward between Poupart's ligament and the peritoneum until the point of the forceps comes to lie against the fascia of the external oblique. Nick the fascia and deliver the point of the forceps. Now take a second pair of similar forceps and lock the jaws securely in those of the first. Withdraw the first pair, thus conducting the second pair down along the track of the first to the femoral ring. Now by means of the forceps so placed, seize the end of the sac and pull it forcibly upward and out through the little nick in the fascia of the external oblique. Anchor the neck here with one or two sutures and remove the redundant portion of the sac.

This bears some similarity to Kocher's technique. He proceeds thus: Having fully reduced the hernial contents, he seizes the tip of the sac in a pair of long curved forceps. He then inverts the sac until the tip of his forceps comes to lie against the anterior abdominal wall close against Poupart's ligament. He nicks the fascia and delivers the tip of his forceps carrying the sac. The sac is now drawn forcibly forward, ligated and removed. The neck, however, is not anchored in its new position but is allowed to slip back and may be expected to resume its old position at the internal orifice of the femoral canal. The purpose of Kocher is to get his ligature as high up on the neck of the sac as possible, but why, having once drawn the neck of the sac upward out of harm's way, he should immediately afterward surrender his advantage, it is somewhat difficult to understand.

Baldwin¹⁰ employs a very similar technique but purses the sac and leaves it *in situ*, getting his cue from Macewen. He claims that necrosis

of the sac does not follow; but for all that we believe that most surgeons, after a careful consideration of the points suggested, will agree that his success is due to his displacement of the sac-neck and that the leaving of the entire sac offers distinct disadvantages.

Enough has been said to make clear the principles for which we contend. The procedures suggested are free from all objections and offer great advantages over the methods more commonly in vogue. It is believed that, when surgeons in general understand more perfectly the object aimed at and always to be kept in mind in such operations as those of Macewen, Lexer and others, the old practice of leaving the neck of the sac to invite recurrence at the mouth of the hernial opening will become obsolete.

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THE EXTERNAL MALLEOLAR SIGN.

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WITH

A REPORT OF TEN CASES OF TRAUMA CAPITIS,

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Senior Interne, St. Louis City Hospital.

In order to make clearer the description of the external malleolar sign, concerning which I made a preliminary communication to the St. Louis Neurological Society, May 29th, 1911,* I present the details of a few cases with reproductions of photographs taken to illustrate the manner of inducing this sign and its manifestations.

"To determine its absence or presence the following procedures have been employed. With the patient in bed on the back, the lower limbs *relaxed* and extended, and wholly exposed, the soles and the ankles are readily accessible for the experiment. If possible, especially in doubtful cases, the limb to be tested should not be compressed or touched in any way except at the point chosen for the application of the stimulus. Recalling the possible reactions from indifferent skin areas, especially in profound cord lesions, will make the reason for this precaution clear. Of course, in restless patients it may be necessary to fix the limb, preferably by forcing the thigh against the mattress. With the patient lying on the side, the limbs may be bent at the knee; and by changing sides, each external malleolus is made accessible. Relaxation of the muscles of the legs and feet is very essential for the test in doubtful cases, as muscular relaxation is in tests for reflexes in general. When the patient can be examined sitting in a chair, the most convenient and satisfactory position and condition of the limb are obtained by having the limb to be examined resting on the examiner's knee (the latter sitting at a convenient distance) so that the limb is supported at the lower portion of the calf-muscles. The examiner can change from one side of the patient to the other, thus seeing perfectly, from the external aspect, the ankle, foot, and toes. This position permits the most accurate observation of the toe movements and perfect control of the point irritated and of the intensity of the stimulus applied.

**Interstate Medical Journal*, July, 1911.

"The irritation of the skin is best done with a rather dull steel point (a nail-file not sharp enough to wound the skin has served my purpose); in some cases the test can be made with a stout wooden toothpick, but absence of reaction to such irritation would not be conclusive. The area to be tested is the groove which outlines the external malleolus. In this groove, the point of the instrument used should be drawn from behind forward until the depression between the malleolus and cuboid is reached. This depression seems to be the most excitable point of the area. The degree of irritation applied should always be varied from slight stroking to rather severe scratching with considerable pressure, though it is never necessary to abrade the skin or cause actual pain. *Normally, this stimulus causes no movement whatever of the toes;* it does, however, in some cases, cause reflex contraction of the thigh-muscles exactly like that observed normally when the sole of the foot is similarly irritated. The abnormal reaction consists of extension or fanning of one or more,



Fig. 1.—J. D.



Fig. 2.—J. D.

or of all the toes; I am also convinced that a movement of *flexion* observed in a few cases, which were otherwise shown to have organic disease of the central nervous system, had the same pathological significance as extension had in other cases. In one case, in particular, with Babinski's sign on one side, there was flexion of all toes from the external malleolus of the same side; and before examination of the opposite side, prediction was made that the reversal of movement usually observed would occur on that side. It was found with normal plantar flexion to irritation of the sole. It is notable that this reversal of movement has been observed associated with the reversal of Gordon's sign in several instances. *A striking peculiarity of the external malleolar sign is the fact that with a unilateral Babinski, it is the rule to find the external malleolar sign on both sides.*

"The precautions necessary for this test are thorough relaxation of the limb; repeated and varied application of the irritation; care not to confound voluntary movements of recoil or escape with those excited reflexly. Often two toes, as the second and third, are extended together,

the others remaining unmoved—a movement almost, if not quite impossible of voluntary execution; fanning of the small toes, without extension of the great toe, is likewise practically impossible as a voluntary movement; abduction of the little toe, the others remaining unmoved, is also hardly possible by voluntary effort; but this movement alone has not seemed very significant. Of course, we need to take account of what practice might make possible in toe movements in exceptional instances; very few persons, however, have developed by exercise all the movements of which the toes are capable. Additional peculiarities which mark the abnormal movements excited from the external malleolus are the uniformity of the response with repeated application of the stimulus; their occurrence from a definite, limited skin area, most frequently from the depression mentioned (movements of escape occur from indifferent areas to painful or unpleasant irritation); and the electric-shock-like quality they frequently manifest. Attention given to these points will usually permit one to

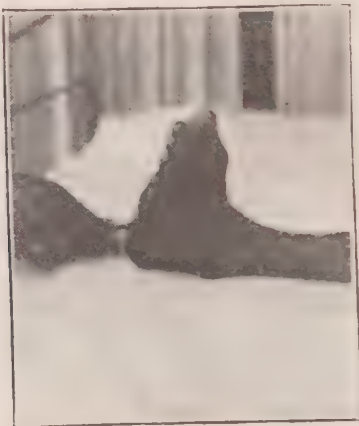


Fig. 3.—J. D.



Fig. 4.—J. D.

differentiate movements reflexly excited from the external malleolus, from voluntary or defensive jerks.

"An abnormal movement which I have previously described in association with the sign of Babinski, and which I have observed as remaining after that sign had disappeared, is slight inward turning of the foot with some dorsal flexion. This movement also occurs occasionally in association with the external malleolar sign. I believe it might have value as a pathological sign to a careful and skilled observer. At any rate, its associations are very significant."*

Case I.—J. D., aged twenty years. Fell from wagon striking face (right side) on pavement, August 23rd, 1911. Unconsciousness continued from time of fall until the morning of August 27th, when his mind cleared up so that he could talk, eat, and walk about. He had been brought to the hospital the evening of the 26th. August 27th, pulse 54, temperature normal. Complaining

*Quoted from my article: "An Explanation of the External Malleolar Sign Made with a View to Incite to the Study of It to Determine Its Place in Semeiology," read before the Society of the City Hospital Alumni, June 15th, 1911; as yet unpublished.

of severe, unlocalized headache, almost delirious from pain. No paralysis; some abrasion (healing) on right side of face; both eyes black. Pupils normal. Deep reflexes all quite lively with slight indication of clonus at ankles. Plantar irritation gives normal flexion of toes on both sides—no indication of Babinski's phenomenon. Irritation of the inframalleolar skin area induces extension and fanning of all toes on each side.

August 28th.—Patient's condition somewhat aggravated. Walked some distance voluntarily to permit photographs to be taken. Fig. 1 shows right plantar flexion from irritation of the sole; Fig. 2 shows extension of all toes to irritation of the external malleolar area; Figs. 3 and 4 show like reaction on the left side.

August 30th.—Condition aggravated; temperature 101°. Babinski's phenomenon now present on right side; slight paresis of left side of face (Dr. Hagler's observation); other reflexes unchanged. Advised left subtemporal decompression because of presence of Babinski's sign on right; eventually, a like operation on the right side.

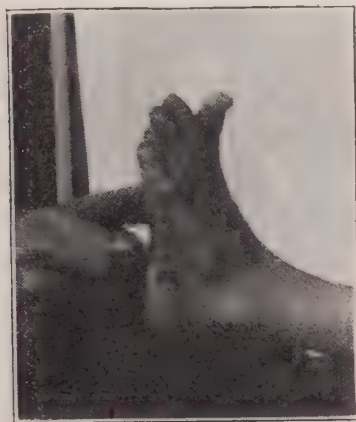


Fig. 5.—E. H.



Fig. 6.—E. H.

August 31st.—Operation (Drs. Rassieur and Bartlett): Left decompression revealed scarcely any increased tension; right decompression done immediately, great pressure found with subdural blood; drainage.

September 1st.—Patient had immediate relief; pulse 72. Babinski's sign has disappeared; right external malleolar sign still present; left plantar flexion, and no external malleolar sign found on left.

September 13th.—Patient has made uninterrupted progress towards recovery. The external malleolar sign is present on the right side; other reactions of toes normal. This abnormal sign may or may not disappear ultimately. Discharged, September 18th.

As an illustration of the ultimate result in a case of head injury, I give the history of Edward H.,* previously reported, and the examination of him made some months later.

Case II.—“Edward H., aged ten years. (Service of Dr. Blair.) Fall from tree; entirely conscious, never unconscious; no sign of skull trauma whatever. Slight weakness of entire left side. Complaint of headache. Reflexes (superficial) right side; nothing from external malleolus; normal flexion from sole; left side: extension of toes from sole and from external malleolus and from external

*Case II.—“A Preliminary Communication, etc.,” *Interstate Medical Journal*, July, 1911.

malleolus to ethyl chloride spray; but no reaction to ethyl chloride from left sole. Subtemporal decompression done on right side; great pressure found but no hemorrhage. Regained power immediately on left side, then lost it, then slowly regained it. Reflexes remained the same as before operation except that normal plantar flexion returned on left side leaving left external malleolar sign at the time of his discharge."

This history dates back to May, 1911. The patient again entered the hospital for typhoid fever late in July. His abnormal ankle sign was found by Dr. Lippmann who knew nothing of his previous history. Careful examination after recovery from typhoid gave the results shown in Figs. 5, 6, 7, and 8. Patient shows no paralysis; hiatus in right temporal region readily revealed to touch; not painful; he is bright and active. The figures show left Babinski with double external malleolar sign of the flexor type.

Case III.—A. M., adult male. (Service of Dr. Schwab and Dr. Leighton.) Fell from second story of barn, striking head and wrenching arms. Never any cere-



Fig. 7.—E. H.



Fig. 8.—E. H.

bral symptoms; paralysis of both arms, wasting of muscles, especially of shoulders, but no paralysis of lower extremities. Patient made slow progress toward recovery. At time of discharge was steadily regaining power in arms. That the injury to both brachial plexuses also involved the cervical cord was shown by the state of the reflexes in the lower extremities. Figs. 9 and 10 show the presence of the external malleolar sign on the left side with normal flexion from the sole; the opposite side presented a similar condition.

The three following cases are examples of central nervous lesions due to other causes than traumatism, in which the external malleolar sign was found in characteristic manner of manifestation.

Case IV.—P., male, aged thirty-eight years, admitted July 20th, 1911. Clear history of lues; eruption four months ago. Mentally disturbed, requiring restraint in bed; very severe headache; Argyll-Robertson pupils, left larger; double slight ankle clonus; external malleolar sign present on both sides, normal plantar flexion to irritation of soles. Figs. 11 and 12 show this fact as presented on the left side. The patient's condition improved under mercury, but he remained demented, and transfer to the City Sanitarium (Insane) became necessary in September. There was no change of the state of reflexes recorded. Patient died

September 17th in a cerebral seizure. Autopsy revealed softening of the left temporal lobe and of all the white substance of the right hemisphere; great congestion of entire brain. Softening was not due to closure of larger vessels; histological examination has not been completed.

Case V.—E. R., male, aged thirty-four years, admitted for second time in August, 1911. First admission July 5th, 1911, when he was in a confused, disorientated mental condition. Mind grew clearer and he was discharged after a few days, not having regained memory of short period preceding his admission. On second admission, brought in for mental observation. Slightly demented, indifferent; speech presents no peculiarities; no tremor. Lues twelve years ago. Argyll-Robertson pupils; lively deep reflexes; external malleolar sign present on each side, with normal plantar flexion to irritation of soles, as shown in Figs. 13, 14, 15, and 16. Patient was transferred to the City Sanitarium with a provisional diagnosis of organic brain disease, probably dementia paralytica.

The external malleolar sign is so frequent, even in the early period of dementia paralytica, that it helped to clear up this case, in which the first attack was provisionally regarded as mental confusion due to heat and alcohol.*

Case VI.—Wm. J., colored, aged twenty-six. Denies lues; no external evidence found of it. Demented in a mild degree. Hemiplegic state (left side) dating



Fig. 9.—A. M.

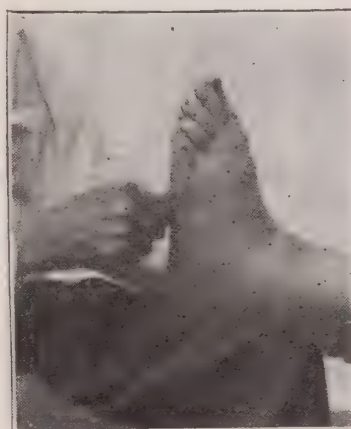


Fig. 10.—A. M.

back eleven months. Presents characteristic signs of left hemiplegia, though face is not involved; pupils equal, but slow to light; platysma sign of Babinski; exaggerated deep reflexes in arm, with perfect wrist-clonus; deep and superficial reflexes (ankle, knee, cremasteric, abdominal) absent; Babinski's sign perfect, external malleolar sign on left side. Right side: all reflexes normal except that there is an external malleolar sign. These findings with regard to the plantar and malleolar reactions are shown in Figs. 17, 18, 19, and 20. Patient was transferred to the City Sanitarium on account of dementia. Examination made on September 18th, 1911, revealed the same findings.

This case is an illustration of the bilateral occurrence of the external malleolar sign in unilateral cerebral lesions. Elsewhere I have suggested that this phenomenon occurring thus bilaterally is due to lesion of crossed

*I now have records of 94 cases of dementia paralytica, males and females; Babinski's sign, with the ankle sign, was found eleven times; the ankle sign was found, single or double, eighty times; neither sign, fourteen times; unilateral Babinski and bilateral malleolar occurred seven times, showing the rule referred to above. Allowing for a certain percentage of error in diagnosis, still the percentage of cases of paresis in which the ankle sign is found is astonishingly large. [The author.]

and homolateral motor fibres by a single lesion. This explanation seems to be strengthened by the order of appearance and disappearance of this phenomenon and Babinski's sign: (1) Unilateral external malleolar; (2) Babinski's sign joining it, with (3) external malleolar sign on the other side; then (4) Babinski's sign joining the latter,—in traumatic cases. The reversal is: disappearance of Babinski's sign with the ankle sign first where they last appeared; then disappearance of the sign of Babinski where it first appeared, leaving the external malleolar sign first observed persistent for a time, perhaps to disappear or to remain as an indication of slight, though permanent, damage done to the central nervous reflex paths on one side.

The phenomenon of Babinski certainly occurs without the presence of the external malleolar sign, though rarely. I am convinced of this; and thus is shown, as by variations of association, the independence of these two signs. Study of their associations and dissociations may afford valuable diagnostic facts.*



Fig. 11.—P.



Fig. 12.—P.

The following record of ten cases of trauma capitis was made by Dr. Deppe of every traumatic skull case we saw together in the St. Louis City Hospital from August 6th to September 11th, 1911. The notes are made as brief as possible, only with a view to show the diagnostic value of variations of the reflexes and the importance to the surgeon of a good understanding of nervous semeiology.

Case VII.—Andrew C., aged five years. Shot in head by playmate. Admitted 9:15 a. m., August 6th, 1911. Unconscious; wound, apparently of entrance of bullet, at the outer margin of the right orbit; considerable swelling in right temporal region. Another wound which appeared to be made by exit of bullet at a point about midway between right parietal eminence and occipital protuberance. Pulse 132; pupils unequal, left larger, reacted sluggishly to light; all tendon reflexes abolished; skin reflexes absent on left side, diminished on right side; bilateral Babinski and external malleolar signs, more marked on the left side; projectile vomiting.

*I am much indebted to Drs. Burns, Deppe, Hagin, and Shroat, all on the staff of the St. Louis City Hospital, for their help in obtaining photographs and making clinical observations in the foregoing and numerous similar cases.

August 6th, 10:00 a. m. Unconscious; all skin reflexes abolished. Operation by Dr. Rassieur; both openings in the skull were freely enlarged; the cortex was found to be lacerated and there was considerable subdural hemorrhage; drainage.

12:00 m. Double external malleolar sign equal; Babinski not readily excited on right but easily on left; skin reflexes absent on left side, present on right; other reflexes as at first.

6:00 p. m. Moving hands, arms, and legs; talking; pulse 136. Babinski found on both sides, more marked on the left; external malleolar signs as before; other reflexes unaltered.

August 7th, 8:00 a. m. Pulse 120; mind clear; Babinski on both sides, less marked on right; external malleolar signs unchanged; tendon reflexes have returned, are active and equal; other reflexes unaltered.

August 8th, 8:00 a. m. Pulse 128; mental condition good; reflexes unaltered from yesterday.

August 9th, 8:00 a. m. Pulse 110; mental condition good; marked Babinski on left side, plantar flexion on right side, but at times Babinski can be obtained on right side; double external malleolar sign more marked on left side; other reflexes unaltered from yesterday.



Fig. 13.—R.



Fig. 14.—R.

August 10th, 8:00 a. m. Pulse 100; double normal plantar flexion (no Babinski); external malleolar on left side, absent on right; skin reflexes returning on left side.

August 22nd.—Improvement has been uninterrupted. Pulse 112; mind clear; no paralysis; pupils equal, and react well to light; tendon reflexes active and equal; skin reflexes active and equal; double normal plantar flexion, no external malleolar signs. Patient was discharged.

Case VIII.—Eugene C., aged twenty-six, laborer. Shot in head. Admitted August 13th, 9:00 p. m. Lacerated wound and hematoma over left frontal region about two inches above the left eye. Unconscious; pulse 64; right hemiplegia; pupils contracted and do not react to light; tendon reflexes present, exaggerated on right side; skin reflexes absent on right side, but active on left; Babinski on right side, normal plantar flexion on left side; no external malleolar sign, slight ankle clonus on right.

9:30 p. m. No response from right sole, fanning and extension of toes from irritation of left sole and at times a marked Babinski; external malleolar sign found on the left side, not on right. Incision over the hematoma revealed great intracranial hemorrhage. The effect of this was to cause disappearance of the left Babinski, but the external malleolar sign on that side remained.

10:00 p. m. Operation by Dr. Leighton. No anesthesia. The opening in skull was enlarged and there was considerable cortical hemorrhage; cortex was found pulpified. A subtemporal decompression done on the left side revealed a tense non-pulsating dura, but no blood was found; wound packed for drainage.

August 14th, 2:00 a. m. Pulse 62; unconscious; no response from either sole; no external malleolar; tendon reflexes absent on right side, diminished on left; skin reflexes absent on left side, other reflexes as before.

8:00 a. m. Pulse 65; unconscious; moves right arm; plantar flexion on left side; no response from sole on right side; external malleolar sign on left side; skin reflexes present on left side; absent on right; tendon reflexes present on left side, absent on right; convulsive movements of left leg. Operation by Dr. Leighton. No anesthesia. Opening in frontal bone enlarged; bullet probed for but not found; drainage.

August 15th, 8:00 a. m. Pulse 64; unconscious; temperature 106:4°; plantar flexion from irritation of sole on left side, no response on right side; external malleolar sign on left; skin reflexes absent on both sides; death at 12:00 m.

Case IX.—William K., aged fifty-seven years, carpenter. Admitted at 11:30 p. m., August 18th. Unconscious; laceration over left eye; no fracture determined at this point; slight hemorrhage from right ear and from nose; pulse



Fig. 15.—R.



Fig. 16.—R.

110; pupils unequal, left larger, do not react to light; tendon and skin reflexes all absent; no response from either sole; no external malleolar sign.

August 19th, 8:00 a. m. Pulse 118; unconscious; double Babinski and double malleolar signs, more marked on right side; other reflexes as before.

10:30 a. m. Babinski diminished on left side, marked on right; external malleolar sign has disappeared on the left side and is elicited with difficulty on the right. Patient died at 11:00 a. m.

The autopsy revealed a fracture of the base of the skull extending from the left zygomatic process through both anterior fossae, the right middle and posterior fossae, ending about two inches above the foramen magnum on the right side; extensive subdural clot on the right side posteriorly, with smaller subdural clot on the left side.

Case X.—Edward N., age and occupation unknown, adult. Shot himself in the head. Admitted August 24th, 8:00 a. m. Unconscious; lacerated penetrating wound in the right frontal region with cortex protruding; hematoma over right parietal eminence. Pulse 120; pupils dilated, equal, irregular, reacted very sluggishly to light; no response from either sole; skin reflexes absent; tendon reflexes exaggerated, double ankle clonus.

8:45 a. m. Spastic condition of both legs; double ankle clonus; external malleolar sign on right, no response from either sole; pupils contracted and do not react to light; other reflexes as before.

10:00 a. m. External malleolar sign appearing on left side; other reflexes as before; clonic contractions occurring over the entire body; pulse 68. Operation by Dr. Young without anesthesia. Wound enlarged; cortex found to be badly lacerated; drainage.

11:30 a. m. No response from either sole; external malleolar sign absent on right side, diminished on left; other reflexes as before. Patient died at 12:00 m.

Case XI.—J. D. This case is Case I of this article. At the time of his discharge, September 18th, 1911, the following nervous findings were noted:—Pupils equal and reacting well to light; skin reflexes active and equal; tendon reflexes very lively, especially on the left side; double normal plantar flexion; pronounced external malleolar sign on the right side. Patient showed no paralysis; well.

Case XII.—George K., aged forty years. Hit on head by stray bullet that had evidently been fired in the air. Bullet had been extracted by a fellow workman. Admitted September 7th, 1911, 4:00 p. m. Conscious; laceration of scalp and



Fig. 17.—J.



Fig. 18.—J.

hematoma over the right parietal eminence. Incision revealed the fact that the bullet had penetrated the outer table of the right parietal bone and had caused depression of the inner table. Pulse 120; pupils unequal, right larger, both react well to light; tendon reflexes more active on right than left side; skin reflexes active on right, absent on left side; double normal plantar flexion; double Gordon, more pronounced on left side; double external malleolar sign, more pronounced on left side; some tendency to clonus at left ankle.

4:20 p. m. Babinski elicited at times on the left side; other reflexes as before noted. Operation by Dr. Reder. Ether anesthesia. Pulse 112; the opening in the parietal bone was enlarged, and the inner table was elevated; a small extradural clot was found at this point; drainage.

September 8th, 8:00 a. m. Conscious; pulse 99. Patient wants to get out of bed. No Babinski; other reflexes as before.

September 9th, 8:00 a. m. Pulse 88; wants to get out of bed. Gordon and external malleolar signs diminished on right side; other reflexes as before.

September 11th, 10:30 a. m. The patient's wife demanded his discharge. Pulse 84; pupils equal and react well to light; tendon reflexes active and equal; skin reflexes active on right side, diminished on left side; other reflexes unaltered. The patient was able to walk home.

Case XIII.—Sidney P., aged thirty-one years, laborer. Struck on head with

an iron bar. Admitted September 2nd, 9:00 a. m. Conscious; incised wound about three inches long over the left temporo-parietal area with a linear fracture of the left parietal bone; no depression. Pulse 80; pupils unequal, left larger, both reacting well to light; tendon reflexes active and equal; skin reflexes all absent except the left abdominals, which are weak; normal plantar flexion on the left side, no response from the right sole; external malleolar sign on the left side, but not on the right.

11:00 a. m. Pulse 86; Babinski elicited at times on the right side; normal plantar flexion on left; double external malleolar sign more marked on the right side; other reflexes as before.

September 3rd, 8:00 a. m. Pulse 88; conscious; double normal plantar flexion; double external malleolar sign; skin reflexes active on left side, diminished somewhat on right side; other reflexes as before.

September 7th, 8:00 a. m. Improvement has been uninterrupted; pulse 84; pupils equal and react well to light; tendon reflexes active and equal; double normal plantar flexion; the malleolar sign has disappeared on both sides. Patient discharged.

Case XIV.—Christ W., aged thirty years, laborer. Fell down elevator shaft fifteen feet. Admitted September 9th, 2:15 p. m. Somewhat cloudy mentally; small laceration and hematoma found over occipital prominence in middle line.



Fig. 19.—J.



Fig. 20.—J.

Pulse 78; tendon reflexes active and equal; skin reflexes active and equal; double normal plantar flexion, but Babinski can be excited from outer border of sole on the right side; no external malleolar sign on either side.

3:15 p. m. Pulse 50 and irregular; stupid; Babinski less readily excited on the right; external malleolar appears on left side; other reflexes unaltered. Lumbar puncture reveals bloody cerebrospinal fluid under abnormal pressure. Slight epistaxis with vomiting of blood.

7:30 p. m. Patient stuporous; double plantar flexion; double Gordon, more pronounced on right side; marked external malleolar on the left side.

September 6th.—Still stuporous, complaining of very severe headache; pulse 56; changes of reflexes consist of double plantar flexion, double Gordon, more pronounced on right, and double external malleolar, more marked on right.

September 7th, 8:30 a. m. No mental change, still great headache; tendon reflexes livelier on right side; skin reflexes diminished on right side; double plantar flexion; double Gordon, more marked on right side, and double external malleolar, more marked on right. Operation, ether anesthesia, at 10:00 a. m. (Dr. Rassieur for Dr. Bartlett.) Pulse 56; left subtemporal decompression revealed fracture of sphenoid and extradural basal clot with intradural pressure and some petechial hemorrhages into brain substance exposed; drainage.

1:00 p. m. Conscious; headache; reflexes unchanged; pulse 80.

September 8th, 8:00 a. m. Conscious, but sleepy; pulse 60; skin reflexes now equal; other reflexes and signs as previously noted.

10:00 a. m. Operation; right subtemporal decompression; contusion of cortex found.

5:00 p. m. Conscious; headache; pulse 58; no alteration of reflexes found from conditions previously recorded.

September 23rd.—Patient is recovering, but has been "flighty" mentally. Headache ceased on September 10th. Reflex signs remaining: right plantar flexion, at times plantar fanning; from right external malleolus, at times abduction of little toe; left plantar flexion; abduction of little toe on left from irritation of left external malleolus; pulse 72.

Case XV.—Charles B., aged twenty-five, chauffeur. Injured in an automobile accident. Admitted September 9th, at 6:20 a. m. Conscious, but it is impossible to get any history from him. Hematoma over the right temporal region; free hemorrhage from nose and mouth; ecchymosis and great swelling of lids of both eyes; pulse 92; pupils equal, react well to light; tendon reflexes active and equal; skin reflexes active and equal; double normal plantar flexion; no Gordon or external malleolar sign on either side.

3:30 p. m. Patient is stupid; pulse 64. Owing to ecchymosis and swelling of lids pupils cannot be examined; tendon reflexes very active and equal; skin reflexes absent on left, active on right side; double Babinski excitable at times; double Gordon indicated; double external malleolar sign; patient states that he is blind in the right eye.

6:00 p. m. Patient's general condition has not altered. Operation under ether anesthesia by Dr. Young. Right subtemporal decompression revealed fracture of the temporal bone with depression and an extradural clot of considerable size with some pulpification of the cortex and subdural hemorrhage.

September 10th, 8:00 a. m. Still stupid; skin reflexes absent on left, diminished on right side; Babinski on left side, normal plantar flexion on right side; no Gordon on either side; external malleolar sign on both sides; other reflexes as before.

September 11th, 8:00 a. m. A little stupid; pulse 68; double plantar flexion; no Gordon; double external malleolar sign; other reflexes the same.

September 12th.—Mentally clearer; pulse 80; double normal plantar flexion; no Gordon; double external malleolar; skin reflexes active on right, diminished on left side.

September 13th, 8:00 a. m. Brighter mentally; pulse 68; external malleolar sign present on the left, absent on the right side; other reflexes the same.

September 16th.—Improvement has been uninterrupted; mind clear; pulse 72; no paralysis; vision in right eye has improved; tendon reflexes active and equal; skin reflexes active and equal; double normal plantar flexion; no Gordon; external malleolar at times on the left side, absent on right; pupils equal and react well to light. Patient was discharged convalescent.

Case XVI.—Willie S., aged five years, newsboy. Fell from street car. Admitted September 11th, 6:55 p. m. Conscious; large hematoma over the left parieto-occipital area; bleeding from left ear. Pulse 100; pupils equal and react well to light; tendon reflexes active and equal; skin reflexes active on left side, diminished on right; double Babinski, double external malleolar sign; both more marked on right side; no Gordon.

September 12th, 10:00 a. m. Patient stupid; double Babinski, Gordon, and external malleolar signs, all more pronounced on the right side; other reflexes as noted.

1:30 p. m. Operation under ether anesthesia by Dr. Rassieur. Pulse 90,

A stellate fracture of the left parietal bone with depression and extradural clot was found. A considerable area of the parietal bone was removed.

September 13th.—Conscious; pulse 92; Babinski on both sides, but more marked on the right; no Gordon; double external malleolar more marked on right side; other reflexes as noted.

September 14th, 8:00 a. m. Pulse 90; reflexes as noted.

September 15th, 8:00 a. m. Conscious, playing in bed; pulse 88; skin reflexes active on left, somewhat diminished on right side; double plantar flexion, but Babinski can be brought out at times on the right side; other reflexes as noted.

September 17th.—Patient is bright; pulse 90; no paralysis; no pain, pupils equal and react well to light; tendon reflexes active and equal; skin reflexes active and equal; double plantar flexion, no Babinski, no Gordon; external malleolar sign brought out at times on the right side, absent on the left side.

3705 Delmar Boulevard.

MEDICAL AND SURGICAL PROGRESS.

ADVANCES IN CANCER RESEARCH.

A REVIEW OF RECENT LITERATURE.

By MOYER S. FLEISHER, M. D., of St. Louis.

1. White and Loeb: The Influence of Harmful Physical Agents (Warm) on the Growth of Tumor Cells. (*Centralbl. fuer Bakt. Parasit. u. Infek.*, Vol. 56, p. 325, 1910.)
Transplantation of Stationary and Retrogressing Tumors. (*Centralbl. fuer Bakt. Parasit. u. Infek.*, Vol. 56, p. 488, 1910.)
The Influence of an Inoculation with Tumor Material of Experimentally Decreased Virulence Upon the Result of a Second Inoculation with Tumor Materials of Experimentally Decreased Virulence. (*Proc. Soc. Exper. Biol. and Med.*, Vol. 8, p. 22, 1910.)
2. Lambert: The Influence of Mouse-Rat Parabiosis on the Growth in Rats of Transplantable Mouse Sarcoma. (*Journ. Exper. Med.*, Vol. XIII, No. 2, 1911.)
3. Rous: A Transmissible Avian Neoplasm. (*Journ. Exper. Med.*, Vol. XII, No. 5, 1910.)
A Sarcoma of the Fowl Transmissible by an Agent Separable from the Tumor Cells. (*Journ. Exper. Med.*, Vol. XIII, No. 4, 1911.)
The Relations of Embryonic Tissue and Tumor in Mixed Grafts. (*Journ. Exper. Med.*, Vol. XIII, No. 2, 1911.)
4. Buschke: The Inoculation of Rat Sarcoma and Mouse Sarcoma Into Newly-Born Animals. (*Berlin. klin. Wochenschr.*, Vol. 48, p. 215, 1911.)
5. Loeb: The Parthenogenetic Development of Ova in the Mammalian Ovary and the Origin of Ovarian Teratoma and Chorion-epithelioma. (*Journ. Amer. Med. Assoc.*, Vol. LVI, p. 1327, 1911.)
Rapid Simultaneous Appearance of an Adenocarcinoma and Squamous Cell Carcinoma at the Nipple of a Mouse. (Reported at a Meeting of the American Association for Cancer Research, at Buffalo, April 12th, 1911.)
6. Gruenbaum and Gruenbaum: The Results of Some Experiments Undertaken to Test the Hormone Theory of the Causation of New Growths. (*Journ. Path. and Bact.*, Vol. XV, p. 289, 1911.)
7. Rohdenburg, Bullock and Johnston: The Effects of Certain Secretions Upon Malignant Tissue. (*Archives of Internal Medicine*, Vol. 7, p. 491, 1911.)

While research in cancer by means of experimentation upon lower animals has not as yet been successful in bringing to light any evidence regarding the cause, nor any definite knowledge which might point to a possible means for curing this disease, still, many interesting facts have been learned concerning the growth of tumors and concerning the possibilities of producing artificial immunity in these lower animals. And these observations certainly are to be considered as the early stepping-stones leading toward a fuller knowledge of cancer.

The accumulated results of experimental research have made more and more evident the fact that the development of our knowledge of the growth of normal tissue, and the factors and stimuli influencing such growth, will be of great importance in shedding light upon our knowledge of cancer. We find that cancer cells differ less in their reactions of growth from normal cells than was formerly considered to be the case. With the view of extending and correlating knowledge of the growth of normal and cancerous tissue, we find that to-day many investigators are making a careful and close analysis of the growth of both these tissues.

White and Loeb have continued and amplified some earlier experiments of the latter's, concerning the influence upon the growth of inoculated tumors. Loeb had found that heating a tumor to 44° C., for some time before inoculation, retarded the rate of growth of the graft, lengthened the period of incubation—namely, the period elapsing between the inoculation and the earliest appearance of a palpable mass at the site of inoculation, and that as the exposure of the tumor to the heat was lengthened, the number of tumors which retrogressed increased. In this recent work the influence of heating upon the growth of the tumor has been studied in detail and the relative influence of heating for various lengths of time has been analyzed. Thus it was noted that within certain limits, that is, up to about forty or forty-five minutes, the period of heating has no influence upon the number of "takes": successful inoculations in which the tumor gave evidence of growth, independently of whether it continued to grow or only grew for a short time and later retrogressed. When the period of heating was continued over an unusually long time, the number of "takes" did fall below the average; thus the number of "takes" gives evidence only of the more marked harmful influence.

The latent period, growth, energy, and numbers of retrogressed tumors show a common relationship to the time of exposure to heating, and, to a certain degree, the influence upon these qualities is proportional to the length of time of heating. The latent period becomes gradually longer, the rate of growth of tumor more sluggish, and the retrogressions more common as the exposure to the heating increases. Therefore, it appears that these three activities are more delicate determinants of harmful influences than is the number of "takes," and it is probable that these three evidences of the tumor growth are dependent upon one and the same properties of the cell protoplasm.

It was further noted that the tumor cells recover from the harmful influence, provided this does not exceed a certain limit. The inheritance of the retarded rate of growth resulting from the heating lasts during only a few generations, for the heated tumors may eventually grow as large or even larger than unheated tumors. The recovery of the tumor cells from the influence of the heating may be aided by reinoculation into another animal. Even in tumors, which have been heated before

each reinoculation, and in which this heating has been repeated during several generations, no summation of the external harmful influence is noted, no immunity to the same, nor yet a selection of resistant cells. Thus one notes the evident recuperative power and great elasticity of tumor cells.

In view of the apparent resistance of tumor cells to harmful influences and their power of recuperation from the same, White and Loeb believe to have brought forward fresh evidence that tumor cells are immortal, and that as tumor cells usually arise from somatic cells, these latter cells, like germinal cells, must be considered to have at least potential immortality.

In a second communication, White and Loeb have studied the growth-energy of tumors which were transplanted from stationary or retrogressing tumors, using in these experiments rat sarcoma, lymphosarcoma of the dog, and carcinoma of mouse. They found that in animals inoculated with such tumors the growth-energy of the graft was less than in animals inoculated from an actively growing tumor.

Differences were noted in the various kinds of tumor; thus mouse carcinoma gave relatively better results upon reinoculation from a stationary or retrogressing tumor than did the lymphosarcoma of the dog.

Further, the stage of retrogression at which the transplantation was undertaken influenced the result, better results being obtained when the tumor was transplanted during the earlier stages of retrogression.

By repeated transplantations it was possible to restore a retrogressing tumor to its original "virulence"—namely, to bring it once more to the rate of growth of the original strain. Here again is evidence of the elasticity and recuperative powers of tumor cells.

The means, which have been used in these experiments to restore to the tumor its original properties, have been purely mechanical—to wit, the handling during transplantation, and are comparable to the stimuli which normally give rise to regenerative processes. The removal of the pressure of the connective-tissue capsule must be considered as a factor in the restoration of the energy of the tumor cells.

In addition, by the transplantation the tumor cells are placed in a new environment and may thus be relieved from certain unfavorable influences which may have existed in the earlier host.

In his earlier work, Loeb had thought of the possibility of using the tumor material of experimentally-decreased virulence as a protective vaccine against a second inoculation with more virulent tumor material; and White and Loeb have now reported on some preliminary experiments in this connection.

They found that if the heated tumor material did not give rise to any growth, no immunity was noticeable. If the preparatory inoculation (with tumor material of experimentally-decreased virulence) gave rise to a temporary growth which was followed by spontaneous retrogression, an immunity against subsequent inoculation was obtained in many, but not in all cases. When mice are inoculated with heated tumor material, and this grows, they can be successfully inoculated a second time with tumor material of experimentally-decreased virulence. In some cases both tumors grow, and the second may grow as well as in mice in which the first inoculation did not take. Usually, however, only one tumor grows after two successive inoculations with material of decreased virulence, and sometimes it was the first inoculation that grew, or again, only the second inoculation grew.

Thus it appears that in a certain number of cases the growth of a tumor protects, to some extent, against a subsequent inoculation with tumor material of experimentally-decreased virulence. This protective influence does not seem to be present, however, in all cases. The variable energy of growth of the first and second tumors probably complicates the results, and these studies must be considered as only a preliminary report.

It is well known that when a mouse tumor is transplanted into a rat or vice versa, that the implanted tumor will show signs of growth for eight to ten days, but that later the tumor is destroyed and absorbed. Ehrlich explains this primary growth as being due to the carrying over with the tumor material of a specific food substance, *X-Stoff*, which is, however, absent in the new host. Since the *X-Stoff* brought over with the mouse tumor is soon exhausted, the tumor material cannot live in the new host. Lambert has attempted artificially to improve the conditions for the growth of mouse tumors in rats by operatively joining rats and mice so that there is an interchange of the body fluids.

By means of the mouse-rat parabiosis, Lambert hoped to supply to the strange host (in this case the rat, since he used a mouse sarcoma) some of the nutritive fluids of the normal host, and thus to increase the period of life of the transplanted tumor. He found that under the influence of the mouse-rat parabiosis, the pieces of mouse tumor transplanted into rats grew for at least seventeen days, thus considerably longer than when no interchange of body fluids took place. He was unable to continue the parabiotic condition for longer than eight to ten days, as the mice usually died at this time. He states that his results might be accepted as confirming Ehrlich's hypothesis; but, in view of the complexity of the factors involved, he recognizes the possibility of other explanations of his results.

The methods used to discover a parasite which might be considered as the causative agent in cancer, or to obtain some evidence pointing to a parasitic origin of cancer, have been multitudinous. Rarely has any definite evidence been obtained which points to such an origin. Rous has, however, been able to obtain evidence which points to the parasitic origin at least of the tumor which he used in his experiments.

Rous has been able to transplant a sarcoma noted in a hen into other hens—this being the first transplantable avian tumor reported. At first it was possible only to transplant this tumor into fowls very closely related to the original hen in which the tumor arose. Later, after the tumor had been transplanted through several generations, it was found possible to transplant it into other less closely related fowls. That this tumor was a true sarcoma there was very little doubt, since the grafts developed from the transplanted cells. Metastases take place usually by the bloodstream, and animals in which the tumor has retrogressed are immune to a second inoculation. Thus this avian tumor presents the main features presented by the ordinary transplantable tumors of mice and rats. Bacteriological examination of this tumor proved negative. It was, however, found that the injection of the cell-free filtrate of the crushed tumor material (obtained by passing through a Berkefeld filter) into hens led to the formation of a tumor which was in every respect similar to the original tumor. It was also possible to produce this tumor by the injection of the dried and powdered tumor material which had been kept at room-temperature for many days.

As a possible explanation of his results, Rous suggests two possi-

bilities: First, there may be a minute parasitic organism which acts as the self-perpetuating agent of this tumor; secondly, the cells of this tumor may elaborate a chemical substance which acts upon the cells of the injected animal in such a manner as to cause these cells to take on the qualities of the sarcoma. These latter cells would again produce this chemical stimulant, and thus perpetuate the sarcoma. Rous does not, however, adopt either one of these theories as proved, but leaves the true explanation to be determined by further investigation.

The theory that tumors arise from misplaced embryonic tissues has long had many supporters, and many attempts have been made to obtain proof to uphold this theory by experimental means. Rous has lately studied the relations existing between embryonic tissue and tumor tissue when these are injected in a mixture into susceptible animals. From the point of view of obtaining support for the theory of the embryonic origin of tumors, his experiments, like those of his predecessors, have failed; the embryonic tissue grew no more actively than when injected alone, and eventually was absorbed as it is in animals when injected without the admixture of tumor material.

Rous further found in these experiments that occasionally a direct union existed between the tumor tissue and some of the stratified epithelial tissue of the embryo, and that the two kinds of cells were so intermingled that it was impossible to delimit the one from the other. Rous argues, as a result of these observations, that one is not justified in all cases where there is an apparent continuity between normal and carcinomatous tissues (especially in epithelioma) in accepting such histological evidence as proof of the origin of a cancer from normal tissue.

A recent observation of Loeb's is of interest: Loeb discovered in a mouse which had an adenocarcinoma of the mammary gland, a second tumor—namely, an epithelioma. The mammary carcinoma had grown upward toward the skin, and at certain places where the mammary tumor had come in contact with the skin an epithelioma had developed, and was growing down into the underlying tissues. It seemed probable that the adenocarcinoma (which is the most common type of tumor among mice) had been primary, and that the epithelioma (which is relatively rare among mice) was secondary. Whether the origin of the second tumor was due to a specific organism being borne to it by the cells of the mammary tumor, or whether this epithelioma developed as a result of the irritant action of the carcinoma cells, cannot be determined, but it seems probable that the epithelioma arose as the result of some action of the first tumor.

Another interesting observation of Loeb's throws some light upon the development of teratoma. In studying the ovaries of guinea-pigs at various stages of the sexual cycle, Loeb has noted structures which appear to be parthenogenetically developing ova. In some cases, chorionic vesicles and syncytial cells were noted and a structure which is probably to be interpreted as a neural tube. Such developing ova were seen by Loeb in about 10 per cent. of young guinea-pigs' ovaries; and since the full history of the animals used was known, it is possible to exclude the suggestion that the ova were fertilized *in situ*. It seems probable that altered conditions in the ovaries (variations in blood-pressure or intra-follicular pressure, and a change in the oxygen supply) may account for the parthenogenetic development of these ova.

In view of these findings it would appear that teratoma and chorio-epithelioma arise from parthenogenetically developing ova, and not from misplaced blastomeres.

Although cancer among human beings (and among animals also) is considered to be rather a disease of old age, it has been stated by Bashford and his co-workers, that in inoculating animals with pieces of tumor material, the younger animals gave better results, that is to say, a larger number of successful "takes" than did the older animals. Buschke has carried these experiments still further, and has attempted to determine whether new-born animals were susceptible to the inoculations of tumors; for this purpose he has used both rats and mice. While he made no observations regarding the relative growth in new-born animals as compared with the growth in older animals, his results show definitely that the very tender age of the animals apparently exerted no influence upon the success of the "takes."

Gruenbaum and Gruenbaum have attempted to determine the influence of the internal secretions of certain glands upon the growth of tumors in rats. They inoculated into animals, which had developed immunity to cancer, a mixture of rat tumor and parotid gland. While none of the rats developed tumors, they found that the simultaneous inoculation of parotid gland seemed to stimulate the growth of the tumor, so that at least for a short time the tumor grew in the immune animals. If parotid gland was inoculated a second or third time into such animals, the growth of the tumor seems again to be stimulated. They further tested the influence of pituitary body, suprarenal bodies, kidney, testes, and liver, and found these organs to have a slight effect upon stimulating growth, but not as marked an effect as the parotid gland.

When the parotid gland was removed from animals, it appeared in a few cases that the growth of the inoculated tumor was interfered with; fibrosis of the tumor was noted in these few cases.

These observers consider their experiments as offering some slight evidence in favor of the hormone theory of the causation of new growths, and suggest that in the development of a tumor certain hormones, which serve to stimulate growth, may act in two different manners. First, there may be an actual and marked hypersecretion of some substance which stimulates growth; secondly, there may be a diminished absorption of some hormone in one part of the body, thus causing a hypernutrition at another part, as a result of which latter there is a hyperstimulation of growth.

Rohdenburg, Bullock and Johnston have also studied the influence of internal secretions upon tumor growth. They have studied especially the influence of the secretions of ovaries, testes, thymus, and thyroid upon the growth of tumors and immunity to tumors.

They found that removal of these various glands seemed to increase the number of spontaneous retrogressions of the grafted tumors.

The removal of these organs, especially the removal of both the thymus and the testes, prevented the development of immunity. Extracts of many organs all of which were treated in a similar manner,—the technique of obtaining these organ extracts is not described in this article,—when injected into animals with small tumors, caused a retrogression of these tumors; occasionally larger tumors retrogressed when such treatment was administered. They believe that possibly as a result of the special methods used for obtaining the organ extracts, the same specific chemical compound is obtained from all organs. By the injection of such gland extracts, mice were immunized against a later inoculation with tumor material. An action of these gland extracts upon tumor cells was sought for *in vitro*, but no evidence of any action was noted here.

The experimental portions of this article seem to be based upon a relatively small number of experiments, and in some cases the results are not clear, and the differences between the control animals and the animals treated by various experimental means are not very sharp.

Rohdenburg, Bullock and Johnston further report here concerning a large number of cases of cancer in human beings treated with organ extracts. Their best results were obtained with extract of thymus gland, and in cases so treated they noted diminution of pain, general improvement, and some diminution of the glandular involvement. In one case—a small recurrence of a mammary carcinoma—they report a cure.

RELATION BETWEEN FUNCTIONAL AND ORGANIC
PROCESSES.

A REVIEW OF RECENT LITERATURE.

By C. FISCH, M. D., of the Editorial Staff.

1. Fischer: The Edema. Translation into German by Carl Schorr and Wolfgang Ostwald. Berlin, Theodor Steinkopf, 1910.
2. Fränkel: Dynamic Biochemical Study of Vital Processes. Wiesbaden, 1911.
3. Von Hansemann: Descendency and Pathology—Comparative Studies and Thoughts. Berlin, August Hirschwald, 1910.
4. Klose and Vogt: Clinic and Biology of the Thymus Gland. Tübingen, H. Laup, 1910.

This short discussion of the interrelation of two processes of different types has been suggested by a book published some time ago, of which the author is von Hansemann, of Berlin, a well-known and able worker in pathology, and widely familiar with all the other branches of medicine and natural science, as well as the study of the different and identical characters in the life of animals and vegetables. In addition to the results of his own experiments, the contents of the book comprise a critical discussion of the enormous amount of work hitherto undertaken in the hope of explaining descendency; hence these excellent qualities must be a source of information for all who wish to know the different theories, or what books or journals should be consulted if further knowledge is required. Undoubtedly we have here the result of labor covering many years.

This book, then, will be the main portion of my review. Its chapters—introduction, preformation, species and varieties, variability, condition of constancy, altruism, purpose (*Zweckmassigkeit*), orthogenesis, Lamarckism, functional adaptations, epidemics, physiological death, and conclusions—show conclusively its breadth and what advantages must accrue to the reader who follows the lines in a scientific spirit. But it is impossible to go into each chapter in detail, for the space required would be all out of proportion with what is allotted for this review in the JOURNAL. Nevertheless attention should be called at once to the second chapter, which is really the basis of all the others. It deals with the explanation of the wonderful capacity of the ovum to produce the diametrically opposite structures and functions of the grown organism. The name "Idioplasm" has been used for a substance that is present in every cell arising from the ovum. This, of course, would mean that every cell must be the same as the other, and that idioplasm in itself cannot cause the differentiation between the different organs, tissues and cells. For this reason, other theories were worked out to prove that idioplasm was not a substance *per se*, but that the ovum contained a great number of minute particles of different functional character that were transmitted to the division cells. This led to the belief that these different particles could be found in various quantities in single cells. But granting this, how is it possible that they are always transmitted in the same quantity?

In reply to this question, no scientific proof has been advanced; it is a biological predestination. The formation of the adult organism, being uniformly regular, proves without a doubt, that this theory can be easily attacked.

In plants idioplasm is thought to be distributed through the whole plant. It is possible by cutting a small piece of a begonia, for instance, to produce a new plant. In the animal body, however, idioplasm is more or less confined to the organs of reproduction. Experience shows that in higher animals the loss of any member of the body is not replaced by new growth; this obtains in mammals and birds. On the other hand, in the lower animals we find the organs reforming; for example, a tail, a leg, and even a head. This shows that idioplasm must be present, even in the adult state, in every cell. In still lower animals, in the lumbricus, for instance, the worm can be cut into pieces and each piece will grow out into a complete worm.

Von Hansemann, though not opposed to the discussion of various theories, is firmly convinced that there exist in an ovum specific substances. He calls this a mechanical explanation in contradistinction to the biological idea of a sensitive origin of the differentiation of the cells; but though his contention would at first appear against a biological interpretation, it is nevertheless of the same nature. Biology is an individual, not a natural science. The author's discussion of the cause of tumors is, of course, on the usual lines; and he points out that so far we do not know anything positive about the causation, and that although all animal transmissions are interesting, no further light has been thrown on the nature of cancer, despite Bashford's assertion to the contrary. It can readily be seen that von Hansemann's ideas are in close relation with idioplasm and his conclusions are that the early separation of cells from their normal location may cause this special modification; he denies, however, that embryonic cells can remain alive for a long time in the growing organism. That the first division-cells of the ovum have the same quality as the ovum itself is proved by the teratomata and by the chorion-epitheliomata in males. Of course, it is mechanically impossible to advance proofs, in a direct manner, that would hold, but we know this much, that other facts in pathology and other sciences rest upon similar bases. The specific agent, the cause of a natural process, has no significance, since it is a mere term, and furthermore the beginning and ending of all natural processes are non-existent. We must, however, regard a cause as a premise in our scientific work, just as belief in a Higher Power is the keystone of religion. The word "absolute" should be eliminated from all scientific discussion.

What has been said in this paper in regard to the second chapter of von Hansemann's book applies to all the other chapters. But though all of them are above the ordinary, the discussion of epidemics, and especially of physiological death, is so interesting that a translation of the latter would not be out of place here.

"I have mentioned," says the author, "all those facts which are generally responsible for the disappearance of races. The question is, however, whether the cause is physiological or pathological. Certainly the destruction of the species by catastrophies cannot be characterized as physiological. Where the extermination is the result of the disastrous effects of climate or of epidemics brought into communities by a strange species, the cause must be held as pathological. The destruction which results from the evils of the products of digestion is, in my opinion, also patholog-

ical, while on the other hand, the destruction which is caused by the natural wear and tear of life on account of our "altruism" is physiological. There is, however, a great difference between the death of a species and that of a single individual. This difference is due to the fact that a species can avoid death by changing its place of habitation or by adapting itself to a new way of life. But where specialization characterizes the manner of life of a species, a decreased capacity for variation, whether change of habitation or a new mode of life, follows, and hence the species is decimated. In these circumstances the death of a species, similar to the physiological death of the individual, is as natural an outcome for the species as for the individual."

On the whole von Hansemann believes that there is a descendency; this, of course, is only a personal belief, since he is unable to give any better proof than circumstantial evidence. He accepts Darwin's theory of natural selection, although he is aware that there are no facts to substantiate this theory. Hence he is a biologist who follows in the footsteps of Darwin. All this, however, does not detract from the great value of a book that stimulates the reader's thoughts in regard to problems which as yet have not been solved.

One important defect in von Hansemann's discussion is his consideration of cells as builders of the body,—as individual sources of the normal functional state of the organism. He forgets that the cells are only the division of the whole and are differentiated in specific character by physical and chemical (mechanical) reactions which are in process. At no distant time, the subject of the dependence of normal equilibrium of the whole organism will be satisfactorily studied, and then we shall ascertain that the minute portions—the cells—are not the sources of the normal functional state of the organism. The interrelation between the various parts of the body is sufficient evidence that the whole organism is the activating factor in what is known as the normal state. Our knowledge of the cells has taught us much, but we must not forget that cells do not control the organism, but that the organism controls them. This interrelation is called by him altruism.

The difficulty attending exact physical and chemical study, so as to arrive at definite data in regard to the changes in an organism, is shown by the labors of Klose and Vogt when they made a thorough histological investigation of the thymus and of the effect of thymus resection. What they ascertained has shed a great deal of light on the question whether the thymus should be removed or not, a matter which was first agitated by Basch. To arrive at any definite conclusions, some knowledge as to the true function of the thymus was absolutely necessary. As is known, the thymus has a neutralizing effect by rendering nuclein, or its combination with phosphoric acid, harmless. When nuclein is removed, intoxication follows. This hypothesis rests on the fact that when nuclein is absent from the organism, there are loss of calcium in the bone, lessened alkalinity or acidity of the spinal fluid, edema of the cerebral tissues and of other structures. If we admit this, the conclusions arrived at by Klose and Vogt are wrong. Embden, for instance, has shown that when nuclein is absent nothing out of the normal can be found. This shows how uncertain so-called exact studies are in regard to the interdependence of cause and effect in metabolism.

Fischer has done some excellent work so as to find out the obscure origin of the edema which follows the removal of nuclein. He attempted to solve the problem by working on the colloid-chemical basis, and his

experiments were limited to the muscles of frogs. The cause of edema, according to this experimenter, is in the tissue itself. Further experiments were undertaken to explain the swelling of fibrin, gelatine, and other substances. But in Fischer's work there is an absence of facts of a definite nature. To illustrate, he insists that the secretion of the kidneys is due to a relationship between different colloid-chemical reactions. This sort of conclusion, as well as the others, is biological, and must be criticized on the ground of being illogical, since it is based on preconceptions; a fact that destroys the objectiveness that should be inseparable from all scientific undertakings. Clinically considered, Fischer's explanation of edema is of no help, and even here, though his explanation is an honest attempt, he fails to convince.

The second part of Fränkel's "Dynamic Biochemical Study of Vital Processes" is also proof of the fact how imperfect are the explanations of the natural processes. The term "biochemistry" is a *contradictio in adjecto*, since life and chemistry are terms that bear no relation to each other. Fränkel deals with the physical and chemical processes in the living organism and gives a clear explanation of single chemical changes. This is not the place to go into detail with a view of giving a complete account of the various phases of the problem. The value of Fränkel's book does not lie in correlated facts, but in the belief that he has established a purposeful (*Zweckmässig*) series of single facts. But the greatest claim that his book has on the attention of the reader is that it shows that our present ideas, as to the relation between functional and organic processes, contain so much that is hypothetical that it is impossible to interpret a natural process satisfactorily by pursuing only one line of reasoning.

SALVARSAN IN OPHTHALMOLOGY.

A REVIEW OF RECENT LITERATURE.

By JOHN GREEN, JR., M. D., of the Editorial Staff.

1. Best: Salvarsan in Ophthalmology. (*Muench. med. Wochenschr.*, No. 48, 1911.)
2. Cohn: Salvarsan and Eye. (*Wochenschr. fuer Ther. u. Hyg. des Auges*, October 6th, 1910.)
3. Coover: Salvarsan and Syphilis of the Eye. (*Journ. Ophthalmology and Oto-Laryngology*, June, 1911.)
4. de Lapersonne and Levi: Salvarsan and Diseases of the Eye. (*Archives d'Ophthalmologie*, January, 1911.)
5. de Schweinitz and Shumway: A Case of Syphilitic Iritis Treated with Salvarsan. (Section Ophthalmology, College of Physicians, October 20th, 1910.)
6. Denig: Two Cases of Interstitial Keratitis and One of Optic Neuritis Treated by Salvarsan. (*Ophthalmic Record*, December, 1910.)
7. Flemming: Action of Salvarsan on the Eye. (*Archiv. fuer Augenheilkunde*, Bd. LXVIII, 1911.)
8. Michaelis: Salvarsan in Diseases of Eye. (*Deutsch. med. Wochenschr.*, No. 49, 1910.)
9. Nacht: Salvarsan in Syphilis of the Eye. (*Wochenschr. fuer Ther. u. Hyg. des Auges*, December 1st, 1910.)
10. Schnaudigel: Salvarsan in Ophthalmology. (*Archiv. fuer Augenheilkunde*, Bd. LXVIII, 1911.)
11. Seeligsohn: Salvarsan in Interstitial Keratitis. (*Berl. klin. Wochenschr.*, No. 41, 1911.)
12. Stuelp: Salvarsan in Ophthalmology. (*Wochenschr. fuer Ther. u. Hyg. des Auges*, September 8th, 1910.)
13. Stuelp: Salvarsan in Ophthalmology. (*Wochenschr. fuer Ther. u. Hyg. des Auges*, February 23rd, 1911.)
14. Uhthoff: Report on Salvarsan. (*Muench. med. Wochenschr.*, No. 48, 1911.)
15. Westhoff: Salvarsan in Ophthalmology. (*Wochenschr. fuer Ther. u. Hyg. des Auges*, May 25th, 1911.)
16. Wibo: Salvarsan in the Treatment of Affections of the Eye. (*XIV Congrès flamande des Sciences naturelles et médicales*, 1910.)

Shortly after Ehrlich announced the discovery of salvarsan, ophthalmologists began to "try out" the new remedy in cases of ocular syphilis. The earlier trials were made with due caution, for ophthalmologists had learned to fear possible disastrous ocular sequelæ following the use of certain of the newer arsenical preparations, notably atoxyl and soamine. There is recorded a number of well-authenticated instances of

retrobulbar neuritis eventuating in atrophy after the administration of atoxyl; and Ehrlich, fearing a similar untoward effect from arsenobenzol, warned against the use of the drug in any patient showing signs of optic neuritis or retinitis.

With the widespread adoption of salvarsan as a remedy in syphilis, it became important to determine whether this drug was likely to be followed by such sequelæ. Evidence on this point is as yet not conclusive. It is probably true, as pointed out by de Lapersonne and Levi, that there is "no need to exaggerate the dangers of salvarsan as regards vision." Contrasting the effect of atoxyl with that of salvarsan, these authors state that "atoxyl may give rise to true subacute retrobulbar neuritis manifested by definite signs, and comparable with the toxic neuritis, experimental or pathological, due to the effect of quinine, male fern extract, carbon bisulphide, etc. So far no such toxic neuritis has been described following the use of salvarsan. The latter's feebleness coupled with the fact that although given in massive doses, one or two only are administered, renders it much safer, for renal elimination quickly occurs."

Stuelp published one of the first reports of the use of salvarsan in syphilitic disease of the eye. The following is a résumé of his experience. One case of choked disc with oculomotor palsies, cured; one case of syphilitic optic neuritis, rebellious to mercury, cured; one case of keratoiritis apparently cured in eight weeks, then relapsed, and finally cured after a second injection of salvarsan; 3 cases of iritis (one gummatous), cured; one case of exophthalmus with abducens palsy (hereditary syphilis), cured; one case of syphilitic retinitis, cured; one case of optic atrophy, unimproved; 5 cases of interstitial keratitis, four unimproved, one temporarily improved, but relapsed. In a subsequent paper based on personal experience and the literature, Stuelp tabulates the results of the administration of salvarsan in ocular syphilis as follows:—

	Cases	Rapid or good results Per cent.	No results or relapses Per cent.
Eyelid.	3	100	
Conjunctiva.	8	63	37
Cornea.	95	27	73
Sclerotic.	5	80	20
Uveal tract.	85	63	37
Neuroretinitis.	76	63	37
Eye-muscles.	132	33	67
Orbit and trigeminus nerve.	7	100	
	411	66	34

Stuelp noted the occasional appearance of iritis, choroiditis, optic neuritis and ocular muscle palsy two or three months after salvarsan, given in the early stages of the disease. He concludes that salvarsan should be administered: (1) When a rapid effect is desired (primary disease or rapid loss of function); (2) in cases where mercury and the iodides are not well borne or are without effect. In all other cases "rely on older methods."

Occasional ocular complications observed were scotoma scintillans, transitory amaurosis, ptosis and increased tension. Stuelp believes that the sole contraindication to the use of salvarsan (from the ocular standpoint) is the presence of non-syphilitic retinitis or optic neuritis.

Nacht's experience includes 13 cases, of which ten were failures, three

successes. Of the ten failures, five were tabetic atrophies, the remainder parenchymatous keratitis, chronic iridocyclitis and vitreous opacities. The three successes were in iridocyclitis, paralysis of accommodation, and in unilateral paralysis of accommodation and the sphincter of the pupil. The success in the last-named case was only partial, as the paralysis of accommodation persisted after the pupil had regained its normal size.

Westhoff administered the drug intramuscularly in 6 cases. Of 3 cases of iritis, only one showed improvement. In one case of unilateral optic neuritis, the condition improved, but the hitherto sound eye became affected. In one case (choked disc) the patient became unconscious six days after the administration and remained so for five days; vision, which had only been slightly impaired, was suddenly lost, never to be regained. No improvement in a case of retinitis with hemorrhages. Westhoff remarks that "several of these patients improved after a return to the usual treatment."

Fifteen cases of tertiary ocular lesions (all giving positive Wassermann reactions) were treated with salvarsan by Wibo. Cure was effected in 2 cases of interstitial keratitis, and two of paralysis of the extraocular muscles. Slight improvement in several cases of chronic neuritis and retinitis.

Flemming reports the action of salvarsan in 180 cases of ocular syphilis from Greef's clinic. All gave positive Wassermann reactions. No special method was used exclusively. The dosage ranged from 0.3 to 0.7 gm. for adults; for children 0.08 gm. for each kilo of body weight.

Generally speaking, the drug improved vision. There were no signs of poisoning. Of 12 cases of interstitial keratitis, not one showed a definite cure four months after the administration; in some the inflammatory signs diminished, in others there was no improvement. Iritis, chronic iritis and choked disc were favorably influenced. No improvement in a case of sympathetic ophthalmia. No permanent results in paralysis of the extrinsic ocular muscles. Results in cases of optic atrophy and disturbances of papillary action were negative.

Inequality of the pupils was noted by Flemming in 7 cases after injection, and accounted by him a secondary symptom of syphilitic infection.

Flemming states that the results of the treatment, with but few exceptions, were no more pronounced than those obtained by the recognized antisiphilitic therapeutic measures.

Frequently subjective symptoms disappeared quickly, while physical conditions did not change more rapidly than under mercury or the iodides.

Uhthoff found salvarsan of no avail in interstitial keratitis. See-ligsohn and Best met with similar disappointment. Michaelis reports a cure of a case of choked disc incident to cerebral gumma.

Twenty-one cases of ocular syphilis—iritis, keratitis, neuroretinitis, tarsitis, paralysis of the superior oblique, pupillary disturbances in tabes, and optic atrophy—were subjected to intragluteal injections of salvarsan by Schnaudigel. In 20 cases the treatment "succeeded admirably." In the light of his high percentage of successes it is not surprising that he concludes that "in arsenobenzol we have a most important addition to ophthalmic therapeutics." The sole failure was in a case of interstitial keratitis, commenting upon which Schnaudigel remarks that "owing to the indirect blood-supply of the tissue, the cornea is one of the most difficult parts of the body for the action of antisiphilitic remedies."

de Schweinitz and Shumway report the cure in ten days of a case of

iritis papulosa. Two cases of interstitial keratitis and one of optic neuritis rapidly responded to salvarsan administered by Denig, who suggests that a mercurial course prior to salvarsan may give still better results.

In the discussion which followed, Weeks mentioned having observed cessation of photophobia in interstitial keratitis following salvarsan, without any noteworthy clearing of the cornea.

In Coover's case of recurrent iritis, a rapid cure followed salvarsan. The drug was also efficacious in a syphilitic neuroretinitis and hyalitis which had failed to respond to mercury, the iodides and cacodylate of soda.

AMENORRHEA.

A REVIEW OF RECENT LITERATURE.

By HUGO EHRENFEST, M. D., of the Editorial Staff.

1. Carstens: Stem Pessary for Amenorrhea, Dysmenorrhea and Sterility. (*Journ. Amer. Med. Assoc.*, November 20th, 1909.)
2. Editorial: Hypersecretion of the Thyroid. (*Journ. Amer. Med. Assoc.*, December 24th, 1910.)
3. Gellhorn: Amenorrhea. (*St. Louis Medical Review*, August, 1910.)
4. Hoover and Marden: Case of Complete Amenorrhea. (*Surgery, Gynecology and Obstetrics*, March, 1911.)
5. Meirowsky and Frankenstein: Amenorrhea and Tertiary Syphilis. (*Deutsch. med. Wochenschr.*, August 4th, 1910.)
6. Rieck: Hitherto Unrecognized Mechanical Type of Amenorrhea. (*Muench. med. Wochenschr.*, March 16th, 1909.)
7. Rosenberger: Concerning the Etiology of Amenorrhea. (*Zentralblatt fuer Innere Medizin*, February 25th, 1911.)

A most satisfactory presentation of the question of amenorrhea is found in a paper of Gellhorn, from which the following quotations are taken:—

"Amenorrhea is merely a symptom, not a disease *sui generis*. The prognosis and treatment of amenorrhea will depend solely on the correct diagnosis of the primary affection. In the majority of cases we find the cause either in a local condition, *i. e.*, a disease or change of the genital organs, or in a general condition, which affects the entire organism. In a remaining minority of instances, the etiology, as far as our present knowledge goes, is obscure.

"Foremost among the local causes is the physiologic amenorrhea due to pregnancy. The second physiological cause is lactation, which leads temporarily to a hyperinvolution of the uterus and amenorrhea. In debilitated and anemic women, however, or when the period of lactation was unduly prolonged, the amenorrhea may persist as the result of an atrophy of the uterus.

"A comparatively large number of uterine atrophies with consecutive amenorrhea is due to pathologic processes in the puerperal uterus. Puerperal infections may produce a partial gangrene of the uterus by which a portion of the uterus wall is sequestered. Occasionally the patients recover, and the formation of scar tissue results in a complete destruction of the uterine mucosa. In other instances, parametric exudates, perimetric inflammations due to gonorrheal infection, extensive hematoceles, or hemotomas within the broad ligaments after extra-uterine conceptions, may compress the uterus to such an extent that the nutrition of that organ will suffer more or less severely. Finally, deep lacerations of uterus and cervix are liable to cause atrophy. Outside of the puerperium, endometritis and metritis of long standing can affect the uterus in a similar manner. Atrophy and amenorrhea have frequently been observed in vesical fistulæ, particularly in those in which a communication existed between the bladder and the cervix. Atrophy may also be produced artificially by a too strenuous curettage for endometritis, or after miscarriage. A similar unforeseen result was frequently observed when intra-uterine applications of chloride of zinc were the fashion, and in contemporary German literature a number of cases had been reported in which atmocausis, *i. e.*, the intra-uterine use of superheated steam, was followed by complete destruction of the endometrium.

"Diseases of the ovary do not produce amenorrhea except when every trace of ovarian tissue has been destroyed as, for instance, in ovarian abscesses in the wake of severe puerperal infections.

"The atrophic uterus differs greatly from an abnormally small or even rudimentary uterus which, from the very beginning, has been unable to menstruate. In this latter class of cases we have to deal with congenital malformations. It is readily understood why asplasia or hypoplasia of the uterus or ovaries must needs produce amenorrhea.

"There is another congenital malformation associated with amenorrhea which, however, does not come within the scope of this paper. In the cases of imperforate hymen or atresia of the vagina there is no amenorrhea *sensu strictiori*. Menstruation occurs regularly but the blood is retained within the upper portion of the vagina, the uterus, and the tubes, thus forming a hematocolpos, hematometra, or hematosalpinx respectively.

"The local causes of amenorrhea rank, as far as their frequency and practical importance are concerned, behind those which have their origin in some affection of the entire organism. It may be stated as a general proposition that a 'constitutional amenorrhea' may be found in almost all diseased conditions, acute or chronic, which make heavy demands upon the vital forces. Such a repression has always been regarded as a conservative effort on the part of nature to preserve the patient's strength.

"Of acute diseases, scarlet fever, articular rheumatism, and typhoid have been observed to cause amenorrhea which usually lasts through convalescence until health is re-established.

"Among the chronic constitutional affections, chlorosis is the most frequent to produce amenorrhea. Next in order is tuberculosis which may disturb the menstrual function even in the earlier stages of the disease. In Graves' disease, severe forms of syphilis and nephritis, in acromegaly and Addison's disease amenorrhea is frequently but not regularly noted.

"The authorities differ as to the effect of diabetes upon menstruation. Obesity exerts a marked influence. Kisch observed in 87 obese women amenorrhea 15 times; abnormally scant menstruation, 47 times; profuse menstruation, 20 times.

"Chronic poisonings of lead or mercury, morphinism and alcoholism occasionally produce amenorrhea.

"Amenorrhea, however, may occur without any apparent cause in perfectly healthy and normal women. The fact has been established that such women may even conceive; therefore, in these cases the function of the ovaries was not disturbed.

"How subtle the influences are, which may lead to amenorrhea, can be seen in women who lose their menstruation temporarily if they move from one place to another or change their daily occupation.

"When amenorrhea occurs in sisters or in members of one family, it seems difficult to exclude hereditary influences, perhaps on an atavistic basis. Merely psychic factors are at times at work, particularly in neurotic individuals. This is best illustrated by the interesting cases of 'nervous pregnancy' where either the intense desire for children, or the overwhelming fear of having conceived may produce not only all the subjective symptoms of gestation but amenorrhea as well. Common as these cases are, the mechanism of the causation of amenorrhea still remains within the realm of speculation—as, indeed, this whole chapter is in need of a great deal of elucidation.

"Any therapeutic effort must needs take the etiology of the individual case into consideration. *The whole question of amenorrhea, therefore, is primarily one of diagnosis.*"

In concluding his article with an extensive reference to the various dietetic, hygienic, local conservative, and surgical methods of treatment, Gellhorn emphasizes the self-evident fact that the choice of the most promising therapy in the individual case is dependent on a thorough examination not only of the genital, but of all the organs of the amenorrheic woman.

In recent literature we find many advocates of the apparently well-established theory of a close connection existing between the function of the genital organs and of the glands with internal secretion. An unsigned editorial in the *Journal of the American Medical Association* states that the absence of menstruation, after it once has developed, without pregnancy or acute or chronic disease, generally points to a diminution of the thyroid and ovarian secretions. If the patient is anemic, iron and ovarian extract should be the treatment. If the patient is not very anemic

and tends to put on weight, thyroid is the treatment. The dose should be small, not more than 3 grains of the dried extract once a day.

Rosenberger, on the other hand, dwells upon the intimate relation of anomalies of the hypophysis to anomalies in the function of the female genitalia, and also to glycosuria. Amenorrhea is common in acromegaly, and in probably one-half of all cases of amenorrhea complicated by glycosuria, in his belief, the underlying cause is an acromegaly. For this reason every case of amenorrhea demands our serious attention. It may be the first sign of a developing acromegaly and, in his opinion, stands to this disease in the same relation as struma does to Graves' disease.

The possible significance of syphilis in the causation of amenorrhea is not generally appreciated, although we find it mentioned occasionally. Meirowsky and Frankenstein observed in three women, aged from twenty-eight to forty-two, an amenorrhea persisting from six to eight years. They all exhibited characteristic symptoms of tertiary syphilis, and were subjected to a rigid mercury and iodide treatment which resulted in the return of the menstrual flow. In one of the women, the oldest, menstruation seemed to reappear in the vicarious type of an epistaxis. The authors suggest an antisyphilitic treatment in all amenorrheic women suffering from syphilis, on the assumption that this disease possibly may interfere with ovarian function.

An observation recorded by Hoover and Marden seems to support the possible hereditary influence also mentioned by Gellhorn. They saw a woman, forty years old, apparently in good physical condition, of average development and intelligence, who had never menstruated in her life, although she had given birth to eleven children. On further investigation the authors found that the patient's grandmother had never menstruated, that her mother had menstruated only at intervals of one or two years. Of the patient's children, one girl of fourteen years had not yet menstruated.

Rieck calls attention to another mechanical cause of amenorrhea, heretofore never described; but it may be stated that his article is not very convincing. He found in two girls, nineteen and twenty-one years old, the uterine body very small and of the infantile type. A circular dense band high up in the uterine cavity seemed to form a complete obstruction to the escape of the menstrual fluid. There are no definite diagnostic features which will permit the recognition of this unusual condition. In both cases it was accidentally discovered when through a vaginal incision the anterior uterine wall was split longitudinally and the uterine cavity laid open. In both cases the operation was followed by menstrual discharge; in one case remaining very scanty, in the other being free and normal.

Among the forms of treatment less favored by modern gynecologists we find the use of the stem pessary. According to Carstens, this method deserves a more general use. In his hands the stem pessary has yielded splendid results in the treatment of the following special types of primary and secondary amenorrhea:—

1. In the small, narrow infantile uterus in otherwise well-developed girls.
2. In a class of cases in which menstruation has been regular and normal for years, but at the age of thirty or thirty-five becomes scanty and skips, and is painful in unmarried women who take little exercise but work hard mentally. The uterus undergoes premature atrophy and is found small.
3. In women who live high, have good digestion, and become fleshy, the menstruation becomes scant and sometimes disappears entirely.

CORRESPONDENCE

PARIS LETTER.

THE FIGHT AGAINST CANCER.

By AUGUSTE A. HOUSQUAINS, M. D.

The Second International Conference for the Study of Cancerous Diseases, which held its meetings in Paris at the close of 1910, has just published a volume of the papers and reports which were read in the course of the meetings as well as the discussions which followed the reading of the papers.

In all the papers which were read the dominating note was that cancer is on the increase. At first one is tempted to attribute this increase to the means of clinical investigation as well as the laboratory methods which are to-day so perfect that the diagnosis of cancer is robbed of nearly all its difficulties and hence is easy of diagnosis. But even if we reason in this manner, it should not be forgotten that cancer is a disease that has seldom been overlooked by the patient himself; and that even if the diagnosis in the past was not of the surety it is to-day in the first stages of the evolution of the disease, it is a fact that its existence was so apparent in the terminal stage that only in exceptional cases was its presence positively ignored. Superficial reasoning, then, must give way before the onslaughts of truth: there are more cases of cancer to-day than there were fifty years ago!

This increase is striking in civilized countries; and with adults it occupies the second place among the causes of mortality, tuberculosis occupying the first place. What renders this statement particularly disquieting is that despite undeniable progress, the therapeutics has remained relatively powerless in combating the disease. In default of a curative treatment, which remains yet to be found, the fight against cancer should consist of a methodic utilization of all the adjuvant means which are at our disposal at the present time, and of a complete co-operation among the physicians who make a specialty, not only of treating but of fighting this disease, to disseminate the best possible means of keeping the disease in check. This co-operation should consist, as was so pointedly said by Castaigne at one of the meetings, of the following three propositions:—

(1) Medico-surgical services should be utilized to study all the forms of cancer, especially in cancer hospitals to which laboratories are attached.

(2) The organization of a society for the study of cancer, to which physicians and surgeons, who make a specialty of treating cancer, should belong, as well as the investigators who study cancer in the laboratories, so that the clinical and laboratory results may be discussed and some control placed on those which are not efficacious.

(3) A committee of publication which is dependent on the preceding society and which should publish, not only the discussions of the society, but also a journal that can be sent gratuitously to all French doctors, so that they may learn the progress which is being effected in the fight against cancer and be encouraged into registering their own cases; and also brochures destined for the public at large, to the end of refuting erroneous opinions which are now current in regard to cancer and which only too often are an obstacle to the rational treatment of this disease.

The most important point in the anti-cancerous armament, and the realization of which is of the greatest urgency, is without doubt the creation of special hospitals organized for the practical and scientific study of cancer. The object of these hospitals is to house all patients who can either be cured or temporarily benefited by operation, sometimes the treatment given in an outdoor clinic sufficing. Patients who cannot be benefited by surgical operation or any other therapeutic treatment should be kept in hospitals, if only to alleviate their suffering. By collecting and arranging the various observations resulting from a study of the cases; by making laboratory researches in parallel cases; by compiling statistics; scientific documents of the greatest value can be accumulated. As examples of this sort of institution we may cite the Middlesex Hospital of London, the endowment at Heidelberg due to the initiative of Professor Czerny, the Barnard (Free) Skin and Cancer Hospital of St. Louis, and the New York Skin and Cancer Hospital. The number of these hospitals should be increased in all civilized countries if we wish to obtain results worthy of so excellent an enterprise. In each of these hospitals four physicians should exercise the following functions: One for the surgical operations, one to give medical treatment, one to practise physiotherapy, and one to make researches in the laboratory. The close and constant collaboration of these four specialists is indispensable.

As regards the creation of societies to study scientifically the question of cancer, there has been one in France for the last three years, which is known as the Association for the Study of Cancer. The criticism which may be brought against this Association is that it is too restricted in its functions, since its publications are destined only for a small number of physicians, and not for physicians at large. That is to say, the work which is done has not the publicity which it should have. Now it cannot be gainsaid that only by dissemination of discoveries concerning the nature and treatment of cancer can a more intimate knowledge of the disease and its treatment obtain among all in the profession. To effect this, what is necessary is the publication of a periodical, which is exclusively for doctors, as well as the broadcast distribution of brochures written in so clear and simple a manner that the education of the public may be effected in combating above all the prejudices which obtain at the present time against the early treatment of cancerous affections.

Every doctor should, at the present time, consider the following rules as essential. In the first place, cancer cannot be treated successfully if an early diagnosis is made in a superficial manner. All the known methods should be brought into play to arrive at a positive diagnosis: hemodiagnosis, intradermal reaction, and the successive analyses of the urine. X-rays, the examination of cavities by the endoscopic method, and finally biopsy, complete the ensemble of necessary researches. Once the diagnosis is established, and this as soon as possible, one should have recourse to surgical intervention, which in the majority of cases is the best treatment in the first stages of the disease. For the operation to be

efficacious, it should be conducted rationally and with precision; it ought above all—and this is really the advice of the most enthusiastic operators—be helped out by adjuvant therapeutic measures. Pierre Delbet, in his treatment of cancer of the breast, begins by using deep radiotherapy; this is followed at the end of some days by globular extirpation of the breast and the painting of the wound with pure tincture of iodine. Finally, he places under the clavicle a tube containing at least three centimetres of bromide of radium, and this is left in place one or two days. Other adjuvant measures particularly applicable in inoperable cancers are fulguration, electro-coagulation, chemical dressing of the wound, serums, vaccines, and opotherapy. Apropos of analgesic medication, it is necessary to insist on the fact that the dose of morphine ought to be accurately gauged if one wishes the desired effect; otherwise this drug will only produce further inconveniences.

But even though physicians may know perfectly well the means which are at their disposal to combat cancer, this should not suffice; for above all what is of prime importance is this, that patients should be treated sufficiently early by these methods. To accomplish this it is absolutely necessary to educate the public and destroy the many prejudices which now obtain even among the best educated.

An interesting communication by M. Beclère contains popular instruction which should be spread at large. The following is the gist of his paper: Cancer is not a constitutional disease and it has not been proved that it is hereditary. In the beginning, it is a purely local disease. Although in its incipency it does not make great inroads into one's health, it nevertheless resembles a parasite which grows and multiplies. Later on very small particles detach themselves from the original tumor and colonize in organs which were not attacked in the first place.

In a great number of cases, cancer is perfectly curable. To achieve this end it is necessary completely to eradicate the growth by a radical operation. It is never the case that one operates too soon. Unfortunately, since the disease manifests itself in the beginning only by a small non-painful tumor, it often happens that it remains unnoticed, and in this the danger lies. It is necessary to make an examination at once, and this should never be done except by an experienced physician. No matter what is said on behalf of other measures for removing cancer, it must be admitted that surgical interference is the best means we have at hand to destroy this growth without pain and without danger; but though this statement cannot be controverted, mention should be made here of certain other agents, such as the actual cautery, chemical caustics, x-rays, radium, and electricity, which may be used with good effect. The early employment of divers methods of local treatment, alone or combined, is really the only way, in a great number of cases, of causing complete destruction of a cancerous growth before it becomes general; that is to say, the definite cure of a disease that is purely local in the beginning.

Such, then, is the aspect of the question of the fight against cancer. One can readily see that the rôle of the physician is not only that of a therapist, but also, to a great extent, that of an agent through whom the popularization of knowledge may do much to prevent mortality, pain, and the employment of means which are deplorably ineffective.

September 10th.

THE NAUHEIM TREATMENT.

BAD NAUHEIM, September 18th, 1911.

Among the many watering places of the German Empire, Bad Nauheim has become the Mecca for patients suffering from cardiac diseases. The city lies 448 feet above sea-level and is beautifully situated on the eastern slope of the Johannisberg, a spur of the Taunus Mountains. Over 30,000 persons visited this place last year and an equal number have returned this year. The bath-houses are comfortably arranged with large entrance- or waiting-rooms in the centre, while the individual bath-rooms run out on each side, leaving an ornamental court with fountain and garden in the centre. The Grand Ducal Bath Administration has made a special provision for physicians, which entitles all physicians with proper credentials to the use of all the baths, free of charge, excepting more than one *Stromsprudelbad*. The *Kurtax*, which patients pay for the use of the baths and for the entertainments given at Bad Nauheim, is not levied on physicians.

The curative resources of this Spa consist primarily of three springs, Nos. VII, XII and XIV, which rise from a depth respectively of 530, 600, and 696 feet. Owing to the strength of the CO₂, these springs burst into the air, foaming like champagne. About 6,000 baths can be given daily. Spring No. VII has a temperature of 29.9° C., 2.16 per cent. of salt and 2,277 c.cm. of entirely free carbonic acid. This is the richest spring in carbonic acid. The composition of No. XII is 4.34 per cent. of salt, 1931 c.cm. of free carbonic acid, and the temperature is 34.4° C. No. XIV has a temperature of 32.2° C., 2.82 per cent. of salt, and 1715 c.cm. free carbonic acid. The baths in general use are the thermal, thermal-sprudel, sprudel, sprudel-stream and brine baths. The thermal bath is supplied through a spring, the water of which has been collected in a large outside reservoir where a portion of the carbonic acid gas evaporates and some of the salts precipitate, while the water for the thermal-sprudel bath is collected in closed reservoirs and stored therein for use as needed.

The sprudel bath is prepared from the water of the springs, which is brought through conduits leading from the upper tube direct into the bath; while the sprudel-stream bath is the same except that it has a special contrivance by which there is a continuous in- and out-flow of the waters. The great advantage of Bad Nauheim over the bath procedures in homes lies in the fact that the bath can be given in every desired degree of dilution with or without carbonic acid, changed at will as regards the salt contents, and prepared at any temperature needed. Owing to this manifold variety, it is possible to prescribe baths just as they are suited to the temporary morbid condition, and therefore to the individual necessity of the patient. Twenty to thirty baths of from eight to twenty minutes' duration are usually prescribed during a course of treatment. The temperature is gradually lowered from 33° C. to 30° C., and the bath increased in strength according to the indication of each patient's condition. For relative cardiac insufficiency the following course is suitable:—

- 4 Thermal baths, temperature 33° C.
- 4 Thermal baths, temperature 32.5° C.
- 3 Thermal-sprudel baths, temperature 32° C.
- 4 Sprudel baths, temperature 31.5° C.
- 4 Sprudel baths, temperature 31° C.

The course of treatment lasts from four to five weeks, the patient leads a quiet life, a rest of an hour to an hour and a half after each bath is ordered in the recumbent position. Fluids are restricted to one and a half pints in twenty-four hours, and in general a severe dietetic regime is enforced. At the conclusion of the bathing procedure, the patient is sent to some health-resort for a rest of two or three weeks, the so-called after-cure.

Now as to the physiological action of the carbonic-acid bath in general. The action of the carbonic-acid bath on the heart has been compared by Schott with that of severe gymnastic exercise. It is, therefore, a strenuous and not a mild method of treatment, and requires a certain amount of reserve force. The primary action is the same as in all cold-bath procedures, and there is a general rise of blood-pressure if the temperature is below 33° C. This rise takes place rapidly and lasts for half an hour after the bath. The superficial blood-vessels contract stronger in the CO_2 bath than in the ordinary water bath with equal temperature. The dilatation of the deep vessels is only slightly compensatory; and accordingly the increased pressure is maintained and remains uninfluenced by the dilatation of the small peripheral vessels and arterioles of the skin, which produces in the bath a slight erythema of the skin. The gas bubbles cover the skin densely, producing a subjective sensation of warmth, which feels very agreeable and prevents the patient from being uncomfortable from the lowered temperature. The pulse becomes fuller, respiration deeper, and through the stronger contractions of the heart the superficial organs are better nourished as well as the heart muscles themselves.

As this form of treatment calls forth an extra amount of heart energy, it is not advisable to combine the bath with the gymnastic exercises as carried out under the Schott and Oertel method of treatment. Each case requires under this form of treatment careful and painstaking ordination and observation by a competent physician.

OSCAR H. BENKER, M. D.

• A PROTEST FROM PROFESSOR CLOETTA.

ZURICH, August 21st, 1911.

To the Editors, Interstate Medical Journal:—The June issue of the INTERSTATE MEDICAL JOURNAL contains an article by Drs. Boos and Lawrence with statements relative to digalen, which cannot be permitted to pass unchallenged, as they are not only incorrect, but also show a tendency to promote unfavorable prejudice. I have submitted digalen to physicians for trial; and not until after such eminent clinicians as Naunyn and Senator had made use of it for one year and assured me of its excellent properties, did I permit of its being placed on the market. Of course, even at the present time we are desirous of professional criticism, and such we have in the way of 250 original articles. Of these, 240 (96 per cent.) strongly advocate the use of digalen. Of all these latter works Drs. Boos and Lawrence take no notice, and even do not acquaint their readers with their existence. Instead of an impartial and objective report concerning *all* published articles regarding digalen, the authors mention only some 15 reports for the purpose of proving digalen a worthless product.

I owe it to my self-esteem, relative to my work of many years in the realm of digitalis therapy, as well as to the early investigators who did pioneer clinical work, not to ignore such palpably prejudiced statements.

What now is the import of the adverse articles mentioned by Drs. Boos and Lawrence? Among them we find, for instance, one by Prof. Kottmann, the result of clinical observations made in Prof. Sahli's clinic, which is pretended to show that the toxic dose of digalen is closely allied to the therapeutic. As a matter of fact Kottmann said the very opposite, inasmuch as he emphasized that in spite of the large doses given formerly, digalen never caused any deleterious results. The same therapeutic results, though, could have been obtained by much smaller doses. In other words, Kottmann stated just the opposite of what the authors claim—to wit, that in spite of the large doses formerly administered digalen never produced any alarming symptoms; smaller doses, however, would have been productive of the same clinical results. Thus we see the "therapeutic dosage latitude" of digalen is very wide. The unfavorable relation between therapeutic and toxic dosage reported by the authors is referable to strophanthin and not to digalen; which fact Kottmann expressly states on p. 308, relative to a lethal case, following an injection of strophanthin. It can only be inferred that the authors have confused these statements. As a further proof of the fatal properties of digalen the authors quote Teichmann. Now, as a matter of fact, in his concluding sentences, Teichmann says: "Digalen is a complete substitute for all the galenical digitalis preparations, which as a matter of fact it excels in its standardization and readily regulated dosage." He cautions against its use in cases of advanced arteriosclerosis, which of course is quite self-evident. His last remarks are literally: "The intravenous injection of digalen is an inestimable addition to our knowledge of therapeutics. It is indicated whenever a rapid effect is desired." According to Drs. Boos and Lawrence these remarks stamp digalen as a worthless preparation. Veiel, who is also quoted as saying that digalen could not be considered a desirable substitute for our supply of heart remedies, states in his concluding remarks that while digalen possesses no marked advantages over the known heart remedies, in acute cardiac weaknesses it forms a not to be ignored remedy, the administration of which should not be neglected. I am of the opinion that this puts rather another aspect on the statements of Drs. Boos and Lawrence. It also, I think, demonstrates the fact how "critical" the gentlemen were in making statements, especially when one considers how careful they were in selecting unfavorable statements embodied in 15 articles and totally ignoring the 240 favorable reports.

Even if the authors mention Eichhorst as being opposed to digalen, I am able to say that in an address delivered before the Medical Society of Zurich (*Vide* Protocol of the Medical Society of Zurich, 1911, published in *Correspondenzblatt für Schweizer Aerzte*, 1911) he states: "Of all substitutes for digitalis, after years of experimental work in our clinic, there is *none* which has proven its value to such an extent as digalen." Of this statement of Prof. Eichhorst, the authors were undoubtedly ignorant. I simply mention it to show that if Prof. Eichhorst formerly entertained unfavorable ideas concerning digalen, he has after several years' careful study and observation arrived at a totally different conclusion.

As the three examples selected by me from the work of Drs. Boos and Lawrence are not even properly quoted by them, I will assume for their

benefit that they have allowed themselves to arrive at erroneous conclusions owing to incorrectly quoted statements. As regards the chemical aspect, I would beg all, who have not themselves labored in this field, to moderate their views and judgment regarding this most difficult chapter in glucosidal chemistry. I trust that at no late date the many erroneous ideas still present in the minds of many will have been banished and the entire digitalis chemistry be revealed to us. As regards experimental work relative to the action of digitalis preparations on the healthy animal, I cannot attach importance, if the results obtained shall be used to demonstrate the therapeutic action upon the sick human subject. The action of digitalis upon a diseased human heart is entirely different from that on a normal and healthy animal heart. This is a fact recognized by all physicians, and one need only remind oneself of the strongly toxic effect of strophanthin tincture upon the frog's heart, and remember how far less efficient it is than digitalis, when applied to the human. It is to be regretted that there are still numerous pharmacologists who have been unable to rid themselves of these erroneous ideas. As a result of this the commission, appointed for the Swiss Pharmacopeia and composed of experienced physicians, definitely refused to fix a physiological dosage for digitalis preparations.

Yours very truly,

M. CLOETTA.

DIAGNOSTIC AND THERAPEUTIC NOTES.

TOLERANCE OF INFANTS FOR MORPHINE.—Wichura (*Muench. med. Wochenschr.*, 1911, No. 30). The writer reports a case of morphine poisoning observed in an infant of three months. By mistake the mother gave the baby $\frac{1}{3}$ gr. of the drug, and called the doctor when untoward symptoms were noticed. The child revived in the course of twenty-four hours. Wichura believes that the maximum dose of opium for children, as stated in the textbooks, is too low, and that they are not nearly as sensitive to the drug as is commonly supposed. He has often given codeine, $\frac{1}{3}$ gr., to a child of one or two years for an irritating cough without any appreciable influence.

TREATMENT OF GONORRHEAL JOINTS WITH TR. IODI.—Hildebrand (*Berlin. klin. Wochenschr.*, 1911, No. 31). The author has treated a number of gonorrheal knee-joints and one ankle according to this method with uniformly good results. The cases selected were those of moderate severity, no very extreme case having yet been subjected to this plan of treatment. Five grams of the tincture are injected directly into the joint. The injection is followed by decided swelling, but this subsides in a short time. In all the cases thus far, the mobility of the joint after treatment has been unimpaired.

DILATATION TEST FOR CHRONIC APPENDICITIS.—Bastedo (*Amer. Journ. Med. Sciences*, July, 1911). There are many cases of dyspepsia, so-called, in which the stomach function is normal and in which our suspicions turn toward the appendix without however being able to elicit any definite signs of disease in that organ. Palpation may show little or no tenderness over the appendix region, or if the tenderness seems marked here we are puzzled by finding points of equal tenderness in other regions of the abdomen. Bastedo has made use of the following manœuvre: With the patient in the recumbent position a colon tube is passed eleven or twelve inches into the rectum. Air is injected through this by means of an atomizer bulb. If appendicitis exists, pain and tenderness to pressure develop at McBurney's point as the colon distends. Bastedo has found the test quite useful in the differential diagnosis between uterus-adnexa inflammation and appendicitis. In the former condition the tenderness occasioned by the dilatation of the colon is less acute, lies lower down, and extends toward the middle line.

BLOOD ALTERATIONS IN ACHYLIA GASTRICA.—Waledinsky (*Deutsch. med. Wochenschr.*, 1911, No. 35). The writer reports his observations

on 8 cases of achylia gastrica. In all these the blood showed, if not an actual leucopenia, at least a leucocyte count which was at the lowest limits of normal, the average for the 8 cases being 5,400 leucocytes. The blood was taken in a uniform manner,—in the morning before the ingestion of food. The results of the differential counts were especially interesting, and if confirmed by other examiners will be of considerable diagnostic aid. Thus it was found that the neutrophilic leucocytes were markedly diminished, the average being 48 per cent. instead of 70 to 75 per cent., and the small lymphocytes were correspondingly increased. The percentage of basophilic and eosinophilic cells showed no variation from the normal. These results were found in cases of uncomplicated achylia as well as those accompanied by diabetes, cirrhosis of the liver, Banti's disease, chronic lead poisoning, and chronic nephritis. Gastric carcinoma, which often figures in the differential diagnosis, usually shows an increased number of leucocytes and a percentage of neutrophilic cells at or above the normal.

THE CONCENTRATION OF THE SODIUM CHLORIDE SOLUTION USED IN SALVARSAN INFUSION.—Wehner (*Deutsch. med. Wochenschr.*, 1911, No. 33). Formerly Wehner used the usual strength of sodium chloride solution, 0.9 per cent., in his intravenous injections of salvarsan. The injections were very often followed by fever and sometimes by chills and vomiting. Lately he has been using the sodium chloride in a concentration of 0.6 per cent., and the injections have been followed by no fever or only by a very inconsiderable rise without any disagreeable subjective symptoms. He recommends the weaker solution as far preferable.

THE CHOICE OF TUBERCULINS.—Bluemel (*Muench. med. Wochenschr.*, 1911, No. 34). The number of tuberculin preparations on the market is truly bewildering. Many of them, says Bluemel, have absolutely no therapeutic value, and of those which are really active, the difference between the various ones lies simply in the concentration and absorbability of the preparation. The Koch tuberculin and the tuberculin of Landmann accomplished everything that lies within the power of tuberculin therapy, and are to be recommended because they are easily obtainable, and of standard quality. The most important factor in this method of treatment still remains—the skill and intelligence of the physician. He must be able properly to graduate the dosage and to recognize harmful effects of too large or too frequent dosage. In proper hands the author believes the tuberculins have a decided place in the treatment of tuberculosis, but he reminds the reader that a faulty application can make the best therapeutic agent useless.

BOOK REVIEWS.

DISLOCATIONS AND JOINT FRACTURES. By Frederic J. Cotton, A. M., M. D., First Assistant Surgeon to the Boston City Hospital; Assistant Professor of Clinical Surgery in Tufts College Medical School, Boston. With 1201 illustrations. 830 drawings by the author. Philadelphia: W. B. Saunders Co. 1910. Price, \$7.50.

It is Dr. Cotton's modest statement that his book is made on the theory that no man can do more than present, with pen and brush, what he himself knows from instruction, reading, and personal observation, in as direct a way as is possible. Taking this as a text for his work, he has proceeded in a most direct manner to produce the best book which has ever appeared on the subject of dislocations and joint-fractures. To say the best book is perhaps drawing a long ball, but adherence to this statement has been strengthened in the reviewer's mind as he has become more intimately acquainted with Cotton's book and has more fully appreciated the author's attempt to get out a work which would represent his own ideas and personal experiences. The fact that all the illustrations have come from his hand, and, furthermore, the fact that the illustrations are actually a part of the text illustrating the author's ideas most graphically, are enough to endear the book to anyone who appreciates originality. In this textbook we have none of the old recopied photographs and woodcuts which date back to Malgaigne and Hamilton, but we have instead such illustrations as make the mechanics of the conditions described clear, and such as would give a good idea of modern treatment. Cotton says in his introduction that he originally planned his work as a treatise on dislocations. This plan was abandoned, and for it was substituted the more general title of dislocations and joint-fractures,—a very wise change for the reason that dislocations rarely present themselves to the medical practitioner as such, but rather as injuries to or near the joints, and again dislocations, as such, as the author says, "neatly and academically classified with all the reduction schemes thrown in could be treated in very few pages. This is not so of injuries to and about the joints; these injuries constitute one of the most disastrous fields of surgery, both to the patient and to the surgeon. They are prolific of discontent, disaffection, and legal action." Cotton's book is the first that has treated adequately this dangerous field from a modern point of view, with the possible exception of Stimson's, which covers fractures in general. His work may be said to be a summary of the subject based on his personal experience, and on this much emphasis should be placed. Cotton has not tried to reproduce all that has been written on this subject; he has not gone over the voluminous literature and appended the notes of literary references, but has given us what he terms, "a reaction from benumbing German scholasticism." What doubts he may have entertained, as to the advisability of producing a book in this manner, must surely have been dispelled ere this, for his work has that indescribable charm of being fresh and presenting a personal point of view. To the general practitioner or surgeon who does not look upon himself as an expert in the treatment of joint-fractures, this book, which represents Dr. Cotton's own experience, will prove a most valuable friend.

JOINT TUBERCULOSIS. By Leonard W. Ely, M. D., Consulting Orthopaedist to the County Hospital; Attending Orthopaedist to the Children's Hospital, Denver, Colo.; Member of the American Orthopaedic Association, etc. Illustrated. New York: William Wood & Co. 1911. Price, \$2.50.

The work done by Ely on tuberculous joints is well known to those especially interested in the subject. The book under discussion is a compilation of his already published papers, putting them in sequence and polishing them off a bit into well-rounded book form. The value of this monograph is such that it is hard to estimate it in moderate language. Heretofore the works in English

on this subject were those of Watson-Cheyne and Senn, both long since relegated to the limbo of the obsolete. The books in French and German are full of repetitions and much antiquated lore, furnishing a conglomerate mass of ill-assorted observations, and very few facts; indeed, being largely clinical in their importance. Ely must have been struck by this neglect, for he has turned to his work in a most systematic and energetic manner, and has given the subject what it needed—namely, a thorough overhauling by some strong hand, and a standardization of the observations and theories that have gone before. This assault is first made on the pathology, and he has cleared away many cobwebs and superstitions. The facts gleaned have been applied to the clinical methods in use, the empirical nature of which is all too sadly evident. Thus he has brought the subject of joint-tuberculosis to book, placing it upon a respectable basis, and a modern one.

The method used was to study diligently, without preconceived notions, a large number of specimens, and associate the clinical findings with those of the microscope. The cases which had started from a bone-focus were first investigated, then those of apparent synovial origin,—that old, much-discussed question. Ely has thrown new light upon it; he has found that the disease may start in the synovial membrane; that in many cases there is a bony involvement; but this involvement depends upon the presence of red marrow in the bone. The synovial membrane is vulnerable where it is thrown into ridges and folds, and possesses fringes and recesses; these conformations making the membrane, which is of the lymphatic system, as liable as are other connective-tissue structures to tubercle bacillus invasion. It would be necessary to quote the entire chapter on pathology to give an idea of its clarity and significance. Though it may seem radical, positive, or even revolutionary, it has the mark of careful scientific observation and is expressed in no mincing manner.

The pathology being thoroughly gone over, the author makes his clinical deductions, and these cannot be passed over lightly. Surely a systematic set of ideas is needed by anyone who undertakes the treatment of these conditions. What Ely has given us here is a working basis for treatment, backed up by what he himself has seen under the microscope.

He remarks that no one could imagine one surgeon neatly removing the diseased appendix, while another curetted the organ, and a third treated all cases of appendicitis expectantly; and he points the deadly parallel here to the surgical treatment given tuberculosis of the joint. The object of all treatment is to deprive the tuberculous joint of function. In children, operations which have for their object radical removal of tuberculosis are not to be done. In adults, where practical, the joint should be made stiff. The attempt to remove tuberculous foci with a curette is similar to attempting to remove a pea with a steam-shovel. On one thing he lays special stress: secondary infections after operation must be absolutely avoided.

Perhaps the most creditable thing in Ely's work is his earnestness, since his book speaks with a decided tone of conviction.

THE HUMAN ATMOSPHERE. Or the Aura Made Visible by the Aid of Chemical Screens. By Walter J. Kilner, B. A., M. D. Cantab., M. R. C. P., etc., Late Electrician at St. Thomas's Hospital, London. Illustrated. New York: Rebman Co. Price, \$4.00.

This book may properly be considered from three standpoints—the descriptive, physical and medical. The review, however, deals only with such physical theory as is offered in mechanical explanation of the phenomenon described. That the facts stated are of diagnostic value will be evident, but the reader will be the best judge as to the degree of their value.

The author describes a method of making visible a characteristic atmosphere or *aura* surrounding the nude human form by placing the subject about a foot in front of a suitably prepared dark background in a faint, uniformly diffused sunlight, and viewing him through one of the so-called *pole* screens, or first looking through a darker screen at the light and then at the patient without a screen. The "Spectan ranine" screens consist of two parallel plane plates of glass containing a solution of dicyanin or carmine in alcohol, a few millimetres in thickness. The body is then surrounded by a visible cloud consisting of three parts. Next the body is the *Etheric Double*, a dark band about a quarter of an inch wide and following the contour of the body. Next is the *Inner Aura*.

This is the densest portion of the "atmosphere" and follows the contour, blending with the etheric double and having a generally uniform width of about three inches. Outside this is the *Outer Aura*, characteristic of the person ob-

served. The author concludes that the etheric double is transparent and "does not contain any material." The structure of the inner aura is described as granular and striated. The outer aura "consists of a faint cloud and appears entirely structureless, capable of being illuminated but not luminous." Occasionally the author speaks of the *Ultra Outer Aura* of a patient possessing an unusually extensive aura. The aura is generally referred to as bluish or gray tinged with blue, and in the outer aura are observed *rays*, varying in color and structure.

The physical theory, or mechanical explanation offered by the author, is vague and not at all logical. In fact, quotations from various passages may best serve the purpose of getting at the "explanation," if the book may be regarded as offering one in the physical sense. On p. 93 is found: "The second theory, most probably the correct interpretation of the aura, is that it consists of a force emanating from the body, which like all forces, is invisible in itself, but which becomes perceptible by means of its action on the ether or atmosphere. Whether this supposition is true or not, it certainly deserves careful consideration." Again on the same page: "Fortunately, magnetism, radioactivity and electricity will supply three different kinds of force all producing analogous results; and they can be seen under conditions similar to those that make the human aura visible." On p. 99: "It is more than probable that the force giving rise to the human aura is quite distinct from the above three." On p. 101: "We are compelled to the conclusion that there must be two forces, one which originates in the inner aura, to be called No. 1 *Auric force*; another producing the outer aura, to be termed No. 2 *Auric Force*. . . . No. 1 *Auric force* acts apparently very intensely within a prescribed area, and is, to a certain extent, under the influence of the will." (!) . . . "No. 2 *Auric force* is certainly more mobile and has a wider range of action than No. 1; and, as far as has been determined is entirely independent of the *will power*."

It is obvious that in the modern physical sense we have here no explanation of the existence of the aura, and the problem of its visibility is treated in the same vague way. On p. 108: "Under the circumstances we may safely conclude that individuals who can perceive the human aura and the haze around magnets, etc., receive their power not from keenness of sight, but from a faculty to see rays that are not included in the ordinarily visible spectrum."

At the bottom of p. 112: "The following remarks are completely hypothetical and without proof, but we offer them in default of any other explanation, and ask our readers' kind forbearance if they disagree with them. We do not think an increase in the visual purple alone would be sufficient of itself to account for the perception of the aura, although it is quite possible that it may be some augmentation in the visual purple. It is more probable that there is some change in its constitution which, after a time, by the continuous use of the spectan ranine screen, becomes fairly permanent, and that this alteration enables a person to apprehend rays a short distance beyond the ordinarily visible spectrum."

In conclusion, it may be remarked that the phenomenon described above is of extraordinary interest from both the physical and medical standpoints, but that the explanation offered is entirely inadequate and speculative.

PATHOLOGICAL TECHNIQUE. A Practical Manual for Workers in Pathological Histology and Bacteriology, including Directions for the Performance of Autopsies and for Clinical Diagnosis by Laboratory Methods. By Frank Burr Mallory, A. M., M. D., Associate Professor of Pathology, Harvard University Medical School; Pathologist to the Boston City Hospital; and James Homer Wright, A. M., M. D., S. D., Director of the Pathological Laboratory of the Massachusetts General Hospital; Assistant Professor of Pathology, Harvard University Medical School. Fifth Edition, revised and enlarged, with 162 illustrations. Philadelphia and London: W. B. Saunders Co. 1911. Price, \$3.00.

This book is so well known and has so wide a circulation that to call attention in any special way to the fifth edition would be a matter of supererogation. In the latest edition all further knowledge as regards technique is noted, and just as in the previous editions there is no letting-up of the writers' hold on all those sources of information which have always been their chief characteristic. But though this can be admitted freely, it is with some surprise that the reviewer observes that the important new additions to our knowledge of the nature of the tubercle bacillus have been overlooked. Reference is here made to Much's method, which is superior to all other methods and does away with

the use of antiformin in many cases. The salient feature of Much's method is not its practicability in changing the tubercle bacillus from a bacillus to a congener of the actinomycotic class and similar organisms which cause infections other than the tuberculous sort, but its value in showing the character of the tubercle bacillus in any tuberculous material by the presence of branching chains of tubercle bacilli, the granular structure of the bacilli, and the breaking up of them into single granules, cultivated from a bacillus growth and from inoculation causing infection. On the practical side, Much's method is superior inasmuch as a larger number of bacilli may be demonstrated than by carbolfuchsin, and since other methods only too often prove futile in finding bacilli. And again by this method, granular bacilli may be seen, even the granules themselves. But what should not be forgotten is that antiformin merely preserves the bacilli and granules, and that carbolfuchsin is not capable of staining them.

THE TREATMENT OF SYPHILIS WITH SALVARSAN. By Dr. Wilhelm Wechsellmann, of Berlin, Medical Director of the Skin and Venereal Disease Section, Rudolph Virchow Hospital, Berlin. With an Introduction by Professor Dr. Paul Ehrlich, of Frankfort-on-the-Main, Director of the Royal Institute for Experimental Therapeutics, Frankfurt. Only Authorized Translation, by Abr. Wolbarst, M. D., of New York. Consulting Genito-Urinary Surgeon, Central Islip State Hospital; etc., etc. With 15 Textual Figures and 16 Colored Illustrations. New York: Rebman Company. Price, cloth, \$5.00.

This excellent book is a translation by Wolbarst of the original German work of Wechsellmann upon the treatment of syphilis with salvarsan. It is based upon the results of 1,400 cases treated by Wechsellmann, and contains all the essential features of a large clinical experience, scientific methods of investigation, and broad, conservative judgment. The translator has attempted to adhere, as far as possible, to the original text. Besides the original work of the writer, the literature from which the author draws is almost entirely foreign, which, otherwise, would be beyond the reach of most readers of English. The translation, however, has incorporated a list of American and British observers who have either had some personal experience with the new remedy or have established or correlated the writings of foreign contributors. Salvarsan is considered from every point of view, and the text is richly illustrated with colored plates showing its untoward by-effects as well as favorable results. It embraces the literature on this subject until February, 1910, and consequently gives the most reliable status of this new preparation up to that date. It is a book which throws many important side-lights on this very interesting disease, as well as one which represents the scientific observations of one of the foremost dermatologists having the most extended experience with this new remedy.

THE TREATMENT OF DISEASE. A Manual of Practical Medicine. By Reynold Webb Wilcox, M. A., M. D., LL. D. Third Edition. Thoroughly Revised and Enlarged. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$7.50.

Most textbooks of medicine give all too little space to the consideration of therapy. The present work aims to correct this by devoting itself especially to this phase of the science. More than 40 new sections have been added since the last edition. The author has not confined himself to infectious diseases usually met with in the United States, but has included those of other countries and climates.

HANDBOOK OF THE SURGERY OF THE KIDNEYS. By W. Bruce Clarke, A. M., F. R. C. S. Senior Surgeon to St. Bartholomew's Hospital. With 5 plates and 50 illustrations in the text. New York: Oxford University Press. 1911.

Clarke presents in this "Handbook of the Surgery of the Kidneys," an excellent work on the subject of renal surgery dealing mainly with personal observations and experiences coupled with careful statistical consideration. The book is divided into ten chapters which comprise the normal and abnormal anatomy of the kidney and ureters; methods of examination; operation on the kidney; injuries of the kidney and ureter; movable kidney and its results; hydronephrosis and its causes; stone in the kidney and ureter; tubercular diseases of the kidney; pyelonephritis and other infective conditions of the kidney, including perinephritis; tumors of the kidney and suprarenal body.

Each chapter has a condensed description of the subject and leaves but little to

be desired. The author throughout the work brings out a certain important point relative to a particular phase of renal surgery and follows it with an illustrative case in such a manner that the whole book reads like a novel. The chapter on differential diagnosis is particularly good, and takes up the various methods of differentiation of renal tumors from other abdominal tumors and from each other.

It is encouraging to see that he has had such favorable results with vaccines in affairs of the kidney and bladder. His results have been excellent with colon vaccine. It is an extremely valuable book and a very refreshing one to read.

DISEASES OF THE STOMACH AND INTESTINES. By Bordman Reed, M. D., Member of the American Medical Association, Consulting Gastro-Enterologist to the Pottenger Sanatorium, Monrovia, Cal., Late Professor of Diseases of the Gastro-Intestinal Tract, Hygiene and Climatology in the Department of Medicine of Temple University, etc. Illustrated. Third Edition, thoroughly revised and largely rewritten. New York: E. B. Treat & Co. 1911. Price, \$5.00.

The third edition of the well-known book on diseases of the stomach embraces all the new methods available in diagnosis and treatment of diseases of the digestive system from the standpoint of our present knowledge. As a one-volume edition it practically meets the requirements of such a text. Such subject-matter, as history of individual diseases, speculative discussion as to the mooted points of etiology, pathology, bibliography, etc., has, of necessity, been omitted. It exhibits as a basis much knowledge obtained from an evident extended clinical experience. Considerable space is given to recent innovations in the way of therapeutic resources for diseases, i. e., electricity, x-ray, violet rays, radium, manual and hydrotherapy; and approved hygiene and dietetic measures are consigned to their individual place in each chapter. It is a plain and unpretentious but practical clinical guide for diagnosis and treatment of diseases in question, and should continue to excite interest and approval in students of all branches of medicine.

A PRACTICAL TREATISE ON OPHTHALMOLOGY. By L. Webster Fox, M. D., LL. D., Professor of Ophthalmology in the Medico-Chirurgical College; Ophthalmic Surgeon in the Medico-Chirurgical Hospital, Philadelphia, Pa.; Member of the Army Reserve Medical Corps, etc. With six colored plates and three hundred illustrations in text. New York and London: D. Appleton & Co., 1910.

Dr. Fox has styled his book "A Practical Treatise on Ophthalmology" and the adjective well indicates the general character of the work.

Two courses are open to the author who writes a single volume treatise on diseases of the eye; he may, in a general sense, cover the entire subject, in which case many important topics will be dealt with too briefly; or, he may, by judicious selection, limit himself to such topics as are essential to one seeking a general knowledge of the subject. Dr. Fox has wisely chosen the second method. The treatise, up-to-date and readable, clearly reflects the author's forceful personality. Special prominence is given to methods of treatment and operations originated or amplified by the author. The book is copiously illustrated.

A Festschrift in Honor of Wilhelm Waldeyer on the Fiftieth Anniversary of His Doctor's Degree. *Archiv fuer Microscopische Anatomie*, 87 Band, 33 Tafeln und 96 Textfiguren mit einem Bild von Waldeyer. Bonn: Friedrich Cohen. 1911.

This book of 800 pages contains contributions from authoritative workers in the various branches of medicine and natural science. That it is well worth reading goes without saying, since it contains some twenty-five articles that have all the outstanding qualities which one expects to-day in contributions of a scientific nature. The most exacting student may read this *Festschrift* with profit, and even he, who has not the scientific spirit developed to this extent, will find enough of interest in the pages to hold his attention for long. This matter of *Festschriften*, so sedulously prosecuted by the Germans, deserves the highest commendation, not only on account of qualities which are unusual, but on account of the graciousness which is expressed by the writers in contributing their best thought to a book that is commemorative of the life-work of a teacher, whose message to the world should not be lightly passed over.

VETERINARY BACTERIOLOGY. A Treatise on the Bacteria, Yeasts, Molds, and Protozoa Pathogenic for Domestic Animals. By Robert Earle Buchanan, Ph. D., Professor of Bacteriology in the Iowa State College of Agriculture and Mechanic Arts, Division of Veterinary Medicine; Bacteriologist of the Iowa Agricultural Experiment Station. With 214 illustrations. Philadelphia and London: W. B. Saunders Company. 1911. Price, \$3.00.

This book is one of high interest, since it shows that the course of the infectious diseases of domestic animals is almost identical with what takes place when these diseases attack human beings. But though this is striking, what should not be forgotten is that the character of the infections in man and animal is similar only in a limited number of instances; in the majority there is no resemblance. While this book has been specially prepared for veterinarians, it may be read with profit by the general practitioner who is not above learning the diseases which are peculiar to animals.

A MANUAL OF PRACTICAL INORGANIC CHEMISTRY. Including Preparations and Qualitative and Quantitative Analysis with the Rudiments of Gas Analysis. Specially adapted to cover preliminary and intermediate university courses and the first three stages of the syllabus of the Board of Education. By A. M. Kellas, B. Sc. (Lond.), Ph. D. (Heidelberg), Lecturer on Chemistry at the Middlesex Hospital Medical School, etc. New York: Oxford University Press. 1910.

The book is designed for those who already have some knowledge of the elementary principles of chemistry. As a laboratory textbook it is adapted to meet the requirements of university courses. The last 100 pages of the book deal with quantitative analyses; and there is an almost complete exposition of the technique including quantitative gas analysis.

INTRODUCTION TO PRACTICAL ORGANIC CHEMISTRY. Including Qualitative and Quantitative Analysis and Preparations. With a Special Appendix on the London University Syllabus, and Schemes of Analysis for Stages 1 and 2 of the Board of Education Syllabus. By A. M. Kellas, B. Sc. (London), Ph. D. (Heidelberg), Lecturer on Chemistry at the Middlesex Hospital Medical School, Formerly Examiner in Chemistry to the Conjoint Board of the Royal Colleges of Physicians and Surgeons. New York: Oxford University Press. 1911.

This volume is a companion to the one on inorganic chemistry with the same general plan and aims. The technique of organic analysis receives detailed consideration, including determinations of molecular weight, volumetric fat estimation, quantitative nitrogen estimation, etc.

VACCINE THERAPY. Its Theory and Practice. By R. W. Allen, M. D., B. S. (Lond.), Late Clinical Pathologist to the Mount Vernon Hospital for Diseases of the Chest; Late Pathologist to the Royal Eye Hospital; Late Gull Student of Pathology, Guy's Hospital. Third Edition. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$2.00.

This is the third edition of the author's work upon the vaccine treatment. It has been completely re-written and brought up to date. Besides the original work upon specialized immunity, it includes the five years' experience in this line of therapy as is shown by the illustrative cases, taken from the author's clinical material. Careful study of this book should enable the general practitioner, for whom the book is written, to approach with confidence the case requiring active immunization by means of vaccines.

OLD AGE DEFERRED—The Causes of Old Age and Its Postponement by Hygienic and Therapeutic Measures. By Arnold Lorand, M. D., Carlsbad, Austria. Translated, with additions, by the Author, from the Second German Edition. Philadelphia: F. A. Davis Company. 1910.

The work is little more than a theory or set of theories as to the cause of old age, based upon our as yet rather hazy knowledge of the ductless glands. It is written in popular fashion and very evidently intended for the eyes of the layman. We are unable to see that the book has supplied any pressing need.

BOOKS RECEIVED.

VERSES FROM THE SOUTHWEST. By Theodore Clarkson Merrill. Cambridge: Riverside Press. 1910.

THE WORLD OF DREAMS. By Havelock Ellis. Boston and New York: Houghton Mifflin Company. 1911. Price, \$2.00.

THE KING'S EVIL. By Raymond Crawford, M. A., M. D., Oxon., F. R. C. P., Fellow of King's College, London. New York: Oxford University Press. 1911.

IN AND OUT OF PARLIAMENT. Reminiscences of a Varied Life. By Right Hon. Robert Farquharson, P. C., M. D., LL. D. London: Williams & Norgate. 1911. Price, 12s. 6d.

MENTAL EFFICIENCY AND OTHER HINTS TO MEN AND WOMEN. By Arnold Bennett. Author of "How to Live on 24 Hours a Day," "The Old Wives' Tale," etc. New York: George H. Doran Company.

DER GYNAEKOLOGISCHE OPERATIONSKURS AN DER LEICHE. In 16 Vorlesungen. Von Dr. Wilhelm Liepmann, Dozent der Universitaet in Berlin. Mit 387 Abbildungen. Berlin: August Hirschwald. 1911.

DIAET UND KUECHE. Einfuehrung in die angewandte Ernaehrungs-Therapie. Von Dr. Wilhelm Sternberg, Spezialarzt fuer Ernaehrungs-Therapie in Berlin. Wuerzburg: Curt Kabitzsch. 1911. Preis, 5m.

ON WRITING THESES FOR M. B. AND M. D. DEGREES. By H. D. Rolleston, M. D., F. R. C. P., Senior Physician St. George's Hospital; Physician, Victoria Hospital for Children, Chelsea. London: John Bale, Sons & Danielsson, Ltd. 1911.

BAKTERIOLOGISCHES TASCHENBUCH. Die wichtigsten technischen Vorschriften zur bakteriologischen Laboratoriumsarbeit. Von Dr. Rudolph Abel, Geh. Ober-Medizinalrat in Berlin. Fuenfzehnte Auflage. Wuerzburg: Curt Kabitzsch. 1911. Price, 2m.

LA NEURASTHENIE RURALE. Fréquence, Causes sociales et individuelles. Etude psychologique et clinique de la neurasthénie Chez le Paysan contemporain. Par le Dr. Raymond Belbèze. Préface de M. le Professeur Rémond. Paris: Vigot Frères. 1911. Price 3fr. 50.

A TEXTBOOK OF PHYSIOLOGY. For Medical Students and Physicians. By William H. Howell, Ph. D., M. D., Sc. D., LL. D., Professor of Physiology in the Johns Hopkins University, Baltimore. Fourth Edition, thoroughly revised. Philadelphia and London: W. B. Saunders Company. 1911. Price, cloth \$4.00, half morocco \$5.50.

ONE HUNDRED SURGICAL PROBLEMS. The Experiences of Daily Practice Dissected and Explained. By James G. Mumford, M. D., Visiting Surgeon to the Massachusetts General Hospital; Instructor in Surgery, Harvard Medical School; Fellow of the American Surgical Association, etc. Boston: W. M. Leonard. 1911. Price, \$3.00.

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY. A new and complete dictionary of the terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Nursing, Veterinary Science, Biology, Medical Biography, etc., with the pronunciation, derivation and definition. Including much collateral information of an encyclopedic character. By W. A. Newman Dorland, A. M., M. D., Member of Committee on Nomenclature and Classification of Diseases of the American Medical Association; Fellow of American Academy of Medicine. Sixth Edition, revised and enlarged. Philadelphia and London: W. B. Saunders Company. 1911. Price, flexible leather \$4.50, indexed \$5.00.

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EDITORIAL.

THE ORIGINAL OF SHERLOCK HOLMES.

With the passing of years the interest that was aroused by the Sherlock Holmes series of books upon their first appearance has somewhat abated; but, even though they are not read to-day with the eagerness that marked their advent into the book world, the central figure is quite unforgettable, if only on account of the extraordinary shrewdness with which he manages to dissipate all mysteries. Perhaps in our admiration of the characteristics of this bit of fictional portraiture we laud the author too highly, forgetful all along that he had a model such as is granted to few men, and that about all he did was to throw the magic of his literary art around a living person who was ever a source of inspiration. But acumen on the part of a writer should not go for nothing, for, if this is lacking, many things around him which might yield inspirational ideas are thoroughly overlooked, and the result is not the creation of a flesh-and-blood character, but something that is laughably unreal. Now Conan Doyle, whatever may be the judgment of his literary talent, has the bent of mind that makes much of detail; and whether or not this was inborn or acquired, one thing is certain—he developed the faculty for observing the minutiae of life during those student days when the almost uncanny power of the teacher and physician, who was afterwards to be the prototype of his most famous characterization, enthralled him in the matter of making a correct diagnosis from some minor deviation from the normal standard of health, as shown in one's gait, one's complexion, one's manner of speech. And now that the prototype has passed away, it would be an error of judgment on the part of any medical journal not to do honor to his outstanding qualities as a teacher.

The late Dr. Joseph Bell, consulting surgeon to the Edinburgh Royal Infirmary, differed from most clinicians in this that the beaten paths affected

by them were of small concern to him. By beaten paths we do not mean that he coldshouldered the scientific precepts of his predecessors or his coevals, but that he thought the case out for himself. Never over-weighted by what others had experienced until they achieved a correct diagnosis after futile wanderings by devious ways, with no note in his remarks that would indicate that his mind was not his own but the pale reflection of some other which he was slavishly following, he grasped a clinical situation, not so much on account of the divination which accompanies genius, but on account of his power to observe what may have escaped a greater man. No detail, however insignificant, and also, it may be added here, however unscientific, failed to impress him; and by a synthesis that was deliberately arrived at, he unerringly scored where others with their burden of scientific facts and their own uncontrollable fancies would have failed. His method may not be a success in the hands of others, but it has this in its favor that it makes the eye of the clinician, by its unceasing alertness, the best adjuvant he can possess. How often have we seen expert clinicians cursorily "look their patients over" and then with one or two ideas in their heads hurriedly consult their textbooks in the hope that their "rare insight" into the case will be corroborated by some authority whom they have worshipped through years. This self-gratification is of almost daily occurrence; hence, the gist of the talk of any clinician taken at random resolves itself into that triumphant moment when he reads in his favorite textbook a verification of all he had surmised. But the Bell method—and really it is not farfetched to honor is thus—is another pair of sleeves, as our French confrères would say, for it lays greater emphasis on individual peculiarities as manifested by each and every case than on the most approved teachings of others; though by peculiarities is not meant the end to the means but rather the means to the end. But, of course, the mind of the clinician must be of the Bell calibre; and, as for the eye, can we ever hope that except in extraordinary cases this special organ will be put to its right use in clinical lectures?

It would be well for aspiring clinicians, who are not *au fait* with the characteristics of Dr. Bell's career, to read first the Sherlock Holmes books, since there they will be brought into the best sort of intimacy with those qualities which made him a power in the clinic. And after imbibing the Holmes method of making much of little things, a study of the real physician and teacher would not be inopportune, for directly this is done a realization obtains—provided the clinician is not a dolt—that the searching manner of the detective was in reality the manner of the medical man in all his clinical undertakings. And the lesson that will come home to a receptive mind will not be without point, since it will undoubtedly

make clear at once that the combination of Dr. Bell and Sir A. Conan Doyle, his pupil, cannot but be the means of throwing the greatest light on what should constitute the best method for making correct diagnoses.

SEA-WATER INJECTIONS VS. THE BULGARIAN BACILLUS.

The rapidity with which certain treatments are superseded by others of supposedly equal value appears to be the order of the day. It was but yesterday that a thrill passed through the medical world in regard to the superlative attributes of the Metchnikoff soured milk in entero-colitis, toxi-infections, furunculosis, acne, and eczema; and though for a time the older therapy, which had been applied to these diseases with varying success, wore a tattered raiment, it was not long before a complete rehabilitation took place. Just what the concensus of opinion is to-day as to the unusual qualities of the Bulgarian bacillus has never been published, but we fear the initial enthusiasm has been riddled by so many unkindly darts of criticism that it would require herculean efforts, on the part of some enthusiasts, to establish this special bacillus firmly in the second rank of our therapeutic agents. But why should one expatiate on the present demerits of what was but a few months ago acclaimed as the most alluring therapeutic toy, when newer methods of treatment are clamoring for the enthusiasm which is always part and parcel of the make-up of, alas! too many physicians.

The latest insurgent that is bludgeoning our citadel of indifference is sea-water, and not for recognition of the therapeutic value of sea-bathing either, but for the due appreciation of the high qualities of "isotonic plasma" when administered subcutaneously in enteric and skin diseases. According to reports which have come to us from the Dispensaries Marins of Paris and the recently established Quinton Dispensary of London, there can be no doubt that sea-water injections have "cured" in a marvellous manner; and what with the enthusiasm of the physicians on the respective staffs, and the lay press ever ready to publish the smallest crumb of medical gossip, another perfect page for our textbooks has been evolved that shall light the way when our descendants are in doubt as to just how to cope with cholera infantum, eczema, psoriasis, and many other disturbances of the human organism. It is needless to point out that already a number of doubting Thomases are thrusting pin-pricks into what they regard as inflated reports, and are lashing themselves into a state of frenzy because they are sure "isotonic plasma" is not superior to isotonic or normal saline solution. But is it not a fact that opposition is always rife when enthusiasm is rampant? and is it

not a twice-told tale that small minds are continually on the alert to down all manifestations of genius, all innovations no matter how excellent, all radical advances that might breathe the salvation of the world?

Really when we hear from day to day the additions with which modern therapy is fortifying itself, we feel that perhaps our appreciation of the triumphant strides must be due to our innate lack of optimism. But, on second thought, it must be confessed that this quality, so necessary if smiles instead of frowns are to form the greeting of every new method of treatment, is not so negligible with us as would at first appear, but is merely slightly submerged on account of the many disappointments resulting from remedies which in their early audacities are not modest enough to limit themselves to the "cure" of one disease, but must needs include as many diseases as did soured milk some months back and sea water in its present flamboyant therapeutic state. In short, in the presence of marvellous therapeutic agents that scream multiplicity of "cures" from the housetops, we are at one with the landlord in "The Journey's End," a short story by Jeffery Farnol in the *Century* for November, when he says, "Soldiers I've knowed, and sailors I've knowed, but I never knowed nobody as had been a sailor *and* a soldier."

THE PATHOLOGY OF SPECIALIZATION.

Occupational diseases have been so thoroughly studied that one would suppose we could almost predict what will happen to a man after a few years of over-use of some organs and tissues with under-use of others in the special environments of his trade. Nevertheless, there is a neglected result of the monotony of the extreme division of labor which employers would do well to study, now that scientific management is being invoked to get more efficiency out of labor. Workmen are finding that, by these new methods in which division of labor is being carried to an extreme, the monotony is appalling. It becomes unpleasant, then laborious, all of which means that a given amount of labor requires more expenditure of energy to keep attention fixed. Exhaustion and inefficiency naturally follow. Labor unions are now beginning to think that for the sake of the man, it may be necessary to call a halt, and are insisting upon men having their work more varied. They argue that even if each day's output may be less at first, it will be more in the end because fatigued monotony is never efficient. Besides, the workman will live longer and be efficient longer on account of experience.

We must say that medical science is on the side of the workman in this matter. It is amazing how short is the working life in many trades, such as the more exhausting parts of the metal industries. Though most of

this destruction of vigor is due to over-exertion, there is no doubt in other lines that disuse of mental powers results in dementia, of a sort, to be sure, yet none the less as real as that following brain disease. He who elects to make his living by the exercise of one faculty in a tiny sphere must pay the penalty of atrophy of the rest. The middle-aged workman, incapable of work outside a limited specialty and even unable to think or talk of anything else, is as pitiful a sight as the broken-down actor; and modern industrialism is producing an increasing number for charity, so it is charged. Scientific management may thus save at the spigot and waste at the bung, if society is to be burdened with paupers worn out at forty-five, or even at forty. We must not expect from the human frame more than its capacity, and we must not let our prosperity kill us. There is plenty of evidence that in our mania to pile up national wealth we are paying too high a price. The game is not worth the candle, if we die in the winning.

Physicians themselves might take a hint, for our work is limiting us by ever shortening tethers and unless we slip our collars occasionally, jump the fence and nibble the grass in our neighbor's field, we, too, will find ourselves unable to appreciate anything out of our little area, even if we do see it. The danger of specialism has already been said to be ignorance of other specialties and the relation of all, and this necessarily makes one magnify the importance of his own. We often cannot see the woods for the trees, and it seems to be true that the more one knows in his own wood the more one is incapable of seeing other woods. Great discoveries are frequently, perhaps generally, made by men entirely outside the profession they revolutionize, for the reason that they are not blinded by its details. So we should not allow our special efficiency to make us resemble men looking through a microscope, but try to have a telescopic view of other fields even if we cannot see their details. Mental health as well as efficiency demands it. Otherwise we become staled by the monotony like modern workmen who, according to recent allegations, are being ruined by the craze for efficiency by a management which may prove to be far from scientific. Without possessing great versatility we need not destroy what we do have—or hide it under a bushel.

The reports of "worn-out" workers show that from 10 to 50 per cent., according to the trade, are disabled by neurasthenia. Much of this deplorable condition is of course due to over-strain and long hours without proper relaxation and recreation. Yet it would be worth while to go over the cases again and see if they are not caused by monotonous work which has allowed other faculties to atrophy. In other words, is neurasthenia the right word?

OPINION AND CRITICISM.

PAPER-BAG COOKERY.*

There should be considerable rejoicing throughout the world both among men and women that latterly attempts have been made to simplify our manner of living, especially in regard to the multiplicity of exactions which palatable cooking involves. The fireless cooker which has been with us for some years has many points in its favor; and though there may be some criticism advanced on the ground that the results are not so savory as when the cook-stove held its own against all innovations, all sense of appetite must be in abeyance if a meal thus prepared is visited with condemnation. Now no such charge has been preferred against paper-bag cookery; and since unsavoriness is undoubtedly the unkindest remark that can be made about anything that is supposed to be eatable, we may well congratulate ourselves that the age in which we live has produced so ingenious a culinary necromancer as Nicolas Soyer, late chef of far-famed Brooks's of London.

On closer range this matter of cooking with paper-bags has another aspect. In a country such as ours where a servant's wage is beyond the dreams of the small householder, the drudgery incident to cleanliness of pots and pans devolves on the woman of the household whom circumstances have compelled to exercise her arts in the kitchen. Who has not heard the reiterated complaint that, were it not for the labor involved in this menial work and the mental and physical weariness its daily exaction entails, cooking would not fall short of being a delight. And not until one begins to weigh this matter carefully does one realize the devastating inroads into a woman's organism, which are invariably effected by the continual moil of a near-approach to hygienic principles with respect to all utensils used, and especially to those cumbersome pots that require a deal of furbishing to bring them into a state of culinary respectability.

Physicians in general are really very poor social philosophers, for it is a fact that when they come in contact with the sort of household drudge whom we have attempted to describe, and study the why and wherefore of untoward symptoms, their minds fail to grasp the important part that medievalism, as it reigns in many respects in the kitchen of to-day, plays in the matter of a general "break-down." Of course, a recognition of a plebeian factor such as this would be contrary to the new scientific spirit which is so carefully fostered in the sick-room; but may we ask, in a

*Paper-Bag Cookery. By Nicolas Soyer, Late Chef of Brooks's Club, London. New York: Sturgis and Walton Co. 1911.

spirit of humbleness, would there be so many interesting "cases" to study had some physician of an inquiring turn of mind concentrated a few spare moments on the possibility of lessening the laborious duties of the housewife by bringing his thought into close juxtaposition with that of an inventive genius, so that a reform could be effected? But as has so often been done before, the long-looked-for millennium has come from a non-medical man; and though the inventor may have had no other thought than how best to retain the aroma of food, his name should not be without honor in the medical annals of this century for a successful attempt to combat the essential cause of many a "case" of jangled nerves.

AGAIN "MEDICAL NEWS AND THE DAILY PRESS."

Sometime ago, in a note in this column, we criticised the miserable manner in which medical news was handled by the daily press, and we offered a suggestion that the best service to the public, the paper, and the physician could be rendered only by a close medical supervision of medical news. It was hardly to be expected that the suggestion would be accepted, and we still find pages of well-edited sporting gossip to every line of garbled medical news. Even those papers which aim to give the public honest journalism see nothing paradoxical in maintaining a standard of absolute truth in one thing and of what is worse than untruth in another. Certain medical news logically belongs to the public through the medium of the daily press, but it belongs to the public as true news and not as sensational misstatements of partial truths. A great paper to-day has a corps of editors on regular and special subjects, but the medical editor still has his existence in the realm of dreams. Therefore we more than welcome any indication that the stuff of the dreams may be nearing substantiality, and we more than congratulate the big daily of Chicago which has annexed, as special writer on subjects pertaining to public health, a man whose previous history shows clearly an unusual ability to handle such subjects. We believe that every inch gained is well earned, and as the fall weather produces an inclination toward optimism we can make ourselves believe that in the future medical items may be given the square deal, and that the poor public already burdened with the mystery of medicine may know at least that the papers will take the trouble to sift the chaff from the wheat of medical news. *Veritas pro bono publico.*

LITERARY NOTES.

In "Courtship Under Contract—The Science of Selection" (The Health-Culture Company, New York), the reader will find many lines which indicate that the author, James Henry Lovell Eager, has but small use

for the standards so industriously upheld by the majority of authors who follow the craft of novel-writing. That there is a complete secession is indicated on nearly every page; and when there is so sudden a wrenching from what the conventional mind conceives as right and proper in a novel, it is not surprising that the ordinary critic should stand aghast. To illustrate the originality of this book, one passage should suffice; and though there are many others that are just as unusual, we feel that this one will be an "open sesame" to all the others. The heroine has received a marriage proposal from a comparative stranger and, in reply to his mellifluous speech, says: "Mr. Guy, I am not unmoved by your declaration, neither am I indifferent as to its outcome. It is not unmaidenly to admit that I am drawn to you by no uncertain feeling. . . . Neither of us can fathom the peculiar features of our hidden natures. Character is never an open book printed in cold type, in which a study of it might be made. Only the trials of life and the uncovering of our several weaknesses can inform us whether a life with the other would be endurable and produce happiness. . . . I must insist upon conditions before I would enter into marriage relations with any man. . . . I am not a follower of Ibsen or Shaw, but I hold that the bond of marriage should not be entered into until we shall know each other, and know that a summer romance is not love. I desire fully to know the man before I yield myself to him as wife; and to know positively that there is a mutual love existing between us that will stand the test of time and the conflict of ideals, and to that end I propose to enter upon a probationary period of time, say for six months, during which time I will be his housekeeper and companion, having my own apartment under his roof, but being mistress of my body while we study each other." All this when she was in full possession of "the honest candor of an unsophisticated girl"; and we marvel what her ideas must have been at the sophisticated age, say thirty, though never "a follower of Ibsen or Shaw."

The ninth issue of *Aesculape* is not less interesting than all the preceding issues. This may not seem high praise to those who have not read this excellent French monthly, but to those who are not strangers to its many good qualities, it means that the editor, Dr. A. Rouzaud, is keeping the promises which he made when this journal was first published. These promises were something quite new in medical literature, for they set forth that a medical journal would be published that would combine medicine and literature and art in a way not attempted before. All the issues have borne witness to these promises; and if we single out the ninth it is only because it is the latest. What could be more interesting than Professor Grasset's "Un Demifou De Génie: Auguste Comte" (Auguste Comte: A Semi-insane Genius), Dr. Ameuille's clever

presentation of Dr. Villandre as surgeon and painter, Dr. Paul Laffont's socio-historical sketch of Saint-Lazare with startling illustrations from the paintings of Kupka recently exhibited in the Salon des Indépendants, that artistic home of the bizarre, and others which are equally interesting and whose illustrations have been selected with judgment. The quality of this sort of journal could reach the high-water mark only in France, for there the interrelation between medical science and literature is closer than in any other country, and physicians, though deeply engrossed in medicine, know what it means to all intelligent readers not to sacrifice the literary quality on the altar of science.

Those vital questions, marriage and parenthood, are discussed in a capable manner by the Rev. Thomas J. Gerrard in his book "Marriage and Parenthood: The Catholic Ideal" (Joseph F. Wagner, New York). Aside from the deeply religious tone and the bias which is really an integral part in the discussions, the contents of this book are not without merit; and since it is a fact that the scientific talks on morality, as given forth by the physician, have not as yet made much headway with the laity, perhaps a book of this sort is an excellent substitute. From any point of view a well-written book should command attention, and by well written we do not limit ourselves to the lucid English, but to the sincerity and earnestness of the pervading tone. Moreover, an ideal, no matter whether religious or purely social, deserves great praise, for if there is to be a standard for our morals—and surely all physicians are of this opinion—then something that is a little higher than the accepted standard of to-day would mean a striving for a cleaner life.

In Dr. Charles Reinhardt's "Faith, Medicine and the Mind" (London Publicity Company, London), the reader will find a sane exposition of all those subjects which may be grouped under the term, occultism. Of course, if the reader is decidedly stubborn in the matter of accepting what has latterly been called the newer phase of medical treatment, though it has always been practised at the bedside by the shrewd practitioner, he will close the book at once; but it may be added here, for his benefit, that this procedure would be unwise, for by allowing himself some degree of receptivity his profit will not be a negligible quantity. Physicians of to-day may or may not pin their faith entirely to hypnosis, suggestibility, telepathy; but they must be aware of the fact that mental medicine has enough good points to merit better treatment than has been accorded it in the past. To say that something, which is not so apparent to our understanding that a ready grasp can be effected, should

be consigned to the limbo that holdeth much nonsense, is really a confession of one's narrowmindedness and an attitude that cannot but invite unkindly criticism. Now Dr. Reinhardt's book is no fantastic performance, but a calm survey of matters which some of the greatest medical minds in modern times have sought to explain. Whether or not this latest excursion into the shadowy realms beyond the range of ordinary knowledge is illuminating enough to bring the subjects within closer range, so that the reader of intelligence will no longer be in a state of doubt as to their merits, is a knotty question to decide and dependent to a great extent on one's bias. But what can be said with surety is that any book, that is so well written and so equable in tone, as is this one, when the temptation to exaggerate is ever present in discussions of occultism by enthusiasts, is a step in the right direction, for by its poise a convincingness is brought home to the reader that never obtains when a visionary view of "the marvels beyond science," as Grasset puts it, is taken.

That the individual should be the respecter of social laws is the emphatic note of "Crime and Insanity" by Dr. C. A. Mercier (Henry Holt and Company, New York). But when he fails in his duty, when he outrages public decency by committing crimes, when he shows a disposition to act according to his dictates unrestrained by any desire to regard the life or property of another except as subject to his own conception of the law of vengeance, then this same individual fails to recognize the limitations set upon him by law and order and must be treated as a criminal. That the criminality of his various acts can be proved beyond a doubt is not so momentous, according to the author, as whether the motive emanated from a mind held in the leash of sanity, or from a disordered imagination that is incapable of differentiating between right and wrong. This distinction is a very important point that cannot be dismissed in a cursory manner; hence, it yields opportunities to an author to expatiate on its many ramifications. That Dr. Mercier avails himself of all the pros and cons need not be emphasized here; perhaps any other writer would do the same; but what should be asserted is that few could present the matter in so interesting and concise a manner. In the 250 pages of this book there may not be anything of a startling nature that would move the seasoned criminologist to enthusiasm; but since few of us are adepts in this special chapter of science, it is well that such books as this are published from time to time. And, moreover, the medical expert in insanity as a motive to crime need not disdain this little work, for in it he will find what is so rarely described in his textbooks—namely, "the constitution of human nature and human society, and . . . researches into the means of preservation of life in general."

ORIGINAL ARTICLES.

THE SURGICAL TREATMENT OF PUERPERAL INFECTIONS.

By PALMER FINDLEY, M. D., of Omaha,
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The frightful ravages of puerperal sepsis began with the inauguration of maternity hospitals and continued to the time when antisepsis was effectively put into practice in such institutions. To-day it may be fairly stated that the percentage of morbidity and mortality of puerperal sepsis in hospitals has been materially reduced, while in private practice there has been little or no reduction.

Furthermore, the mortality of childbed fever has been little reduced by tentative measures. This fact is generally appreciated, and we find ourselves confronted with problems involved in the surgery of puerperal infection. We ask:—

Can a local infection be checked in its progress by surgical means so that contiguous structures may not be invaded by the infecting micro-organisms? And again:—

Can a toxemia or bacteriemia be averted by the timely removal of the primary focus of infection?

These vital problems are engaging the attention of all obstetricians. A perusal of the literature convinces me that they can only be solved by more extended clinical and laboratory observations.

Intelligently to apply operative measures, we must know the nature of the infecting micro-organism, and we must know the limit to which the infection has extended. Were this all that is required, I apprehend that the surgical treatment of puerperal sepsis would be readily placed upon an intelligent, rational basis. But we are confronted by a more difficult problem; one which now seems unlikely of solution with our present possessions in diagnosis and prognosis.

How are we to foresee the ultimate outcome of a given case with or without surgical intervention? We treat a case along conservative, non-operative lines and the patient dies. Could we have saved her by timely surgical intervention? We resort to surgery and the patient lives. Would she have lived without operation? Death follows upon surgical interference. Did the operation contribute to the fatal issue or would the patient have died without surgery?

It is a difficult task to formulate the indications for surgical interference in puerperal sepsis because the course of the morbid processes is at times difficult of recognition. This is so because we possess no reliable clinical or bacteriological guides. At the onset of the infection we are unable to foresee the ultimate outcome of the disease. If we adopt tentative, conservative measures the infection may go beyond our control; whereas, if we resort to radical measures at the very onset of the infection, we may, perchance, hasten a fatal issue, or we may later have reason to reflect upon our act as a questionable procedure—a sacrifice that might have been averted had we proceeded with more deliberation.

It is true that adequate laboratory facilities will reinforce our clinical observations so that we can determine with a fair degree of certainty, and at an early date, whether we have to do with an infecting germ of low virulence or of high virulence, and whether the infection is localized or has gained access to the general circulation of the blood. These facts are of the utmost importance and will often serve to determine the prognosis and course of treatment with a fair degree of certainty. Yet with all these facilities at our command we are often in doubt as to the proper course to pursue in the early stages of the infection.

The streptococcus has long been regarded as not only the most commonly found organism in puerperal sepsis (86 per cent. of all cases according to Zangemeister), but by far the most virulent. The recent observations of Fromme, Veit, Bumm, Heynemann, Gonnet, Mayer, Barsch, Zangemeister and others have given us a clearer insight into the nature of the streptococcus as found in the genital tract and blood. Streptococci are found in the lochia of the normal puerperium, but they are of low virulence. Zangemeister found streptococci in the vagina of pregnancy in 32 per cent. of cases, and by the fourth day of the normal puerperium in 76 per cent. of cases. It is, therefore, evident that the mere presence of streptococci in the vaginal secretions is of no special significance in relation to puerperal sepsis. We must go further and determine their degree of virulence.

We are indebted to Fromme for what he believes to be a fairly accurate and practical method of distinguishing between streptococci of low virulence and of high virulence.

Fromme has found that strains of streptococci, which grow poorly in his bouillon-lecithin mixture are generally derived from fatal infections and therefore correspond to the virulent type, while those which grow almost unhindered upon this mixture in concentrated form come from puerperal cases which, in the great majority of instances, have a favorable prognosis; these streptococci, therefore, are to be considered as less virulent, *i. e.*, as saprophytes. Fromme does not presume to give an explanation for these findings.

Reibmayr contends that the bouillon-lecithin mixture of Fromme is not a reliable guide in distinguishing the virulent from the saprophytic

forms of hemolytic streptococci. His opinion is based upon extended observations which have brought him to the conclusion that the distribution of the streptococci throughout the body and the development of severe infection depends mainly upon the susceptibility and resistance of the infected organism, and even more so on that of the infected organ.

It is known that non-hemolytic streptococci rarely cause severe sepsis and that hemolytic streptococci commonly produce, not only a more or less extensive local infection, but are prone to produce general sepsis. But it is further known that hemolytic streptococci show great variations in their degree of virulence. They have been found in the vulva and vagina of normal pregnancy and in the normal puerperium in a small percentage of cases. It has been a long accepted theory that germs found in the blood indicate a grave prognosis. Bumm, however, has observed bacteriemias in which recovery was rapid after removing the primary focus, and Baisch (*Zentralblatt fuer Gynækologie*, No. 28, p. 963, 1909) has shown that fatal sepsis may result in the absence of bacteriemia. *Hence it follows that a bacteriemia is not necessarily fatal,—that the micro-organisms within the blood may be of low virulence.* Fromme has demonstrated the presence of saprophytic micro-organisms in the blood, and their presence in the blood speaks for a favorable prognosis. In the first twenty-four hours of an infection no streptococci have been found in the blood. If prior to their appearance in the blood we are able to form an accurate estimate of their number and of their virulence as found in the lochia, we may find a valuable suggestion as to the proper course to pursue. Between the cases of purely saprophytic infection and those of a virulent bacteriemia, there are many forms of infection which do not permit of ready classification. Such, for example, are the gonococcic infections which are usually superficial and the streptococcic infections which deeply invade the pelvic tissues, but do not gain access to the blood. According to Veit, pus accumulations in the pelvis rarely contain streptococci of high virulence. Unfortunately we do not know why it is that these germs vary so in their virulence; whether the cause rests with the germs themselves or with their environment, probably the latter. Hence, it follows that with our present state of knowledge we are not in command of methods which will serve as infallible guides for our management of these cases.

If we find hemolytic streptococci in the lochia at the onset of an infection, we fear the development of a general sepsis, and by repeated blood examinations we are able to develop our prognosis, but we cannot in any case say at the onset that these hemolytic bacteria will or will not invade the blood; hence, we cannot be certain as to the advisability of removing the uterus as a means of preventing a general infection. *Yet, if good is to come from the removal of the uterus or from the ligating of veins or from the removal of infected placental rests, surgery must be invoked prior to the development of a blood-infection.*

This much we know: non-hemolytic streptococci commonly give rise to mild forms of sepsis, while hemolytic streptococci give rise to both mild and severe forms of sepsis, the extent of which depends upon the number of micro-organisms, their degree of virulence and the tissue-resistance of the individual. In the severe types of sepsis we have to do almost exclusively with hemolytic bacteria. We may be assured that the finding of hemolytic streptococci in the blood calls for a guarded, though not necessarily hopeless, prognosis, the mortality of hemolytic streptococcemia being 80 to 90 per cent.

Sigward reported a fatal case of non-hemolytic streptococci in the blood. He examined 56 fever-free patients in the puerperium, and in 40 of this number (71 per cent.) there were streptococci in the lochia, 38 of which were hemolytic. And again Heynemann examined 50 fever-free puerperal women in Veit's clinic and found hemolytic streptococci in the lochia of 31. These experiences could be multiplied, but enough are quoted to emphasize the well-known fact that hemolysis and virulence do not necessarily go hand in hand; that the finding of hemolytic streptococci in the lochia justifies no more than a guarded prognosis; that the pathological significance of streptococci must be judged clinically and not bacteriologically.

According to Sachs the prognosis is dependent upon three factors, *i. e.*, the resistance of the individual, the location of the infection, and the character of the infecting micro-organisms.

With these fragmentary introductory remarks on the essentially causal factors in the production of puerperal sepsis and their bearing upon the surgical treatment and prognosis of puerperal sepsis, we will briefly consider the various surgical procedures which are proposed for the treatment of these cases.

All authorities do not agree upon the advisability of removing retained placental tissue prior to the development of septic infection. Winter counsels delay and the administration of ergot. He argues that the spontaneous expulsion of placental rests is less likely to be followed by the development and spread of infection than is the artificial removal. Mayer takes issue with Winter and I believe he voices the opinion of the profession at large. He would remove placental rests with the least possible injury to the uterus and at the earliest possible moment, believing that placental remains may harbor saprophytes which in time may become virulent.

Curettage of the infected uterus is universally condemned. It is generally conceded that a thorough curettage of the puerperal uterus is a difficult and dangerous task. "The curette is blind," and is capable of much mischief in the hands of the skilled as well as the novice. In the presence of virulent streptococci the danger is greatest because the inevitable wounds created by the curette will almost certainly be infected and then follows an extension of the infection to the uterine musculature,

the pelvic connective-tissue, the appendages, the peritoneum, and to the general circulation of the blood.

HYSTERECTOMY.

Extirpation of the uterus has been practised in well-selected cases. Mayer would remove the uterus, first when it is the primary focus of infection, and secondly when the infection is confined to the uterus. While the uterus is the primary focus of infection in most cases, it must be borne in mind that the infection may come from the cervix, vagina, vulva, appendix, tonsils, and other tissues.

It is one thing to determine the original focus of infection and another and more difficult task to determine the extent of the infection. We may readily decide that the endometrium is involved, but to say with absolute certainty that the infection has or has not invaded the musculature of the uterus or the parauterine tissue is impossible in the early stages, at a time when such knowledge would be of the greatest benefit. We must confess that as yet we have no certain means of determining the exact limitations of an infection. The clinical signs cannot be relied upon, and, since it is a physical impossibility to take cultures from the deeper-lying tissues, we are at a loss to formulate a plan of action that will insure success in the early management of these cases. Shall we adopt the practice of early extirpation of the uterus in all cases in which there is a virulent streptococcic infection in the uterus, but as yet not in the blood? If we do so there will be much needless sacrifice, for many such cases go on to recovery without such heroic measures and, furthermore, there is the chance of spreading the infection through fresh wounds created in the operation. On the other hand, if we are to wait until it is known that the infection has spread beyond the uterus, the removal of the primary focus will be of little or no avail.

The German Congress of Gynecology and Obstetrics, of last year, discussed this subject, but arrived at no definite conclusions. My own impression, gained from reading their transactions, is that we are not as yet in possession of sufficiently accurate means of diagnosis to make possible the formulating of definite rules.

Hysterectomy in puerperal infection was first performed by Schultze. Hegar followed him with another case. Both cases died. America, and then France, adopted the operation, but in all three countries there has been little practice and much discussion of the subject. All agree that the infected uterus should be removed when possible where it has been perforated or torn, where sloughing fibroids are inaccessible to myomectomy, where multiple abscesses are recognized in the uterine wall, and where the infected placenta cannot be removed through the natural channel. In all these conditions hysterectomy may be permissible provided the infection has not become general and the strength of the

patient will permit. Under these conditions Fehling recorded 61 cases with 55.7 per cent. of mortality; Fause 13 cases (results not given); Herff 7 cases with 4 recoveries; Henkel 3 cases with 3 recoveries; Veit 4 cases with 4 deaths.

Herff records the only case of recovery in which hysterectomy was performed in the presence of a streptococcemia. On the other hand, Hynemann (*Archiv fuer Gynaekologie*, Heft I, LXXXV, 1908) reported 18 cases in which the streptococcus was found in the lochia but not in the blood; all recovered.

Veit would have it that he who operates many of these cases operates too many, and he who has nothing but good results has operated unnecessarily.

I would not undertake to lay down definite rules because of our many shortcomings in diagnosis and prognosis, but I would offer the following suggestions:—

1. In streptococcic endometritis no surgical intervention, *i. e.*, curettage or hysterectomy should be attempted for fear of spreading the infection. I am well aware that a timely hysterectomy in these cases might forestall what would otherwise develop into a fatal septicemia, but the opportunity will seldom present itself in time to be sure that the infection is confined to the uterus (within twenty-four hours). Furthermore, the mortality of the operation, the possibility of extending the infection by creating fresh wounds, and the impossibility of determining with certainty that the infection would invade the blood-circulation were no operation performed, will deter one from taking such heroic steps. Vineberg, while expressing his doubt as to the advisability of extirpating the uterus under such conditions, finds some encouragement in the experiment of Zangemeister who injected virulent streptococci into the tails of mice and found that he could save the life of the animal by amputating the tail within twenty-four hours. These experiments are all the more worthy of consideration because of the fact that mice are less resistant to streptococcic infection than is the human species.

2. In putrid endometritis, which includes sloughing fibroids and placental rests which cannot be removed by the fingers or instruments, the uterus should be removed provided the infection is localized in the uterus. In the 30 cases of Wormser there was a mortality of 23.3 per cent.

3. In multiple abscesses of the uterine wall and in perforation or laceration of an infected uterus, hysterectomy is advisable. Wormser finds a mortality of 47 per cent. in these cases of perforated wounds and 26.8 per cent. of multiple abscesses.

4. It may be reaffirmed that to anticipate a generalized infection by extirpating the uterus, when the above conditions do not prevail, is unwarranted in the light of our present knowledge and experiences.

5. Where only bacteria of putrefaction are found in the uterus,

placental fragments should be promptly removed. These organisms will not attack fresh tissues.

6. Drainage of the uterus must be unobstructed, otherwise the sepsis will be heightened. Cautious dilatation of the cervix from time to time will adequately provide for drainage, and if the uterus is to be irrigated at all only normal salt solution or sterile water should be used, and sparingly so, for fear of spreading the infection. Rarely is it necessary to introduce a rubber drainage tube or gauze through the cervix.

7. Retained membranes can be safely left to nature. They are not easily infected and are usually cast off without creating additional wounds. In fact placental fragments seldom create other than a local infection unless the placental site is wounded in the effort to remove the placenta, and then there is danger of spreading the infection. Winter reported 22 cases of retained placenta; 13 were fever free and the remaining 9 were mild infections.

LIGATION OF THE PELVIC VEINS.

The practice of ligating the veins in puerperal pyemia, as introduced by Trendelenburg, is of great interest and of much promise. Death from pyemia results from the distention of thrombi, from bacteriemia and from metastasis.

If in a thrombophlebitis we are to prevent the onward spread of the infection, the veins must be ligated above the point of infection. It is possible to circumvent a general infection by ligating the common iliac vein above the thrombus when the infection has extended to this point on the one side. If the process is bilateral, both hypogastrics and spermatic veins may be ligated, or the hypogastric and spermatic veins on the one side and the common iliac and spermatic veins on the other and more affected side.

It is hazardous to ligate the veins in the acute stage of a pyemic infection. Bumm, Steinberg, Stromm and many others justify the procedure in the chronic stage. Seitz and Wormser record 37 per cent. of recoveries following ligation of the veins in chronic pyemia; an improvement over conservative methods formerly practised. Latzki, with an experience of 187 cases of septic thromboses, operated twenty-eight times with ten recoveries, which he says is a good showing considering the serious nature of the cases. Williams (*Amer. Journ. of Obstetrics*, 1909) gives the mortality of puerperal pyemia at 66 $\frac{2}{3}$ per cent. In 41 cases treated by the transperitoneal method, excluding those which were not susceptible to cure at the time of operation and those in which faulty technique was applied, there was a mortality of 21.4 per cent. Williams reported 5 cases with a mortality of 20 per cent. Koblanck ligated 6 cases with two recoveries. The transperitoneal route is preferred to the extraperitoneal route approached through the flanks for the reason

that the extent of the involvement of the veins can be clearly ascertained. Contrary to early expressed opinions, chronic bacteriemias are not necessarily fatal. O. V. Herff estimates 30 to 40 per cent. of recoveries, and in both acute and chronic forms of bacteriemias a mortality of 70 to 75 per cent. As yet, there are not a sufficient number of cases operated by approved methods and the proper selection of cases to justify any definite conclusions as to the merits of the procedure. We believe, however, that the ligation of veins at the right time and in the right place is a rational procedure and will be more and more justified as we develop our facilities in diagnosis and prognosis. Certainly the results so far obtained show a signal advance over the methods heretofore practised.

PERITONITIS.

The treatment of acute diffuse puerperal peritonitis is most discouraging—this in marked contrast to that of general peritonitis following appendicitis. This is true because in diffuse puerperal peritonitis we have to do with micro-organisms of high virulence and the resistance of the individual is commonly low; whereas in peritonitis following appendicitis the micro-organisms are usually of lower virulence, and the resistance of the individual is commonly high. Then, too, there is better opportunity to establish direct drainage of the primary focus of infection in appendicitis.

Murphy says, in a personal interview, that the reason for the high mortality in puerperal peritonitis, so-called, as compared with peritonitis following appendicitis is that the peritoneum is involved secondarily in puerperal sepsis; that in puerperal sepsis we have to do with a sub-peritoneal cellulitis. While this is true of a limited number of cases, it cannot be said to be the rule, and, therefore, fails to answer the question in point. In the vast majority of cases the infection spreads from the uterus to the tubes and then to the peritoneum. More rarely it extends through the uterine wall to the peritoneum as in accidental perforation of the uterus.

Acute diffuse puerperal peritonitis is generally regarded as fatal unless operated. Where the infection has spread through the blood-circulation, drainage of the abdomen will be of no avail. If the blood is sterile, no time should be lost in establishing free drainage. Fortunately the blood is late in being invaded in these cases.

All will agree that early and free drainage of the peritoneal cavity is imperative. Of this there is no question, but the difficulty lies in the making of a diagnosis early enough to insure good results. Where the infection has spread directly through the uterine wall to the peritoneum we have to do with germs of high virulence and drainage of the abdomen will rarely be successful. If, on the other hand, the infection invades the peritoneum by way of the tubes, we more often have to do with

germs (streptococci, staphylococci, gonococci) of lower virulence; hence, the results from drainage are correspondingly better.

In general, the technique of abdominal drainage, of the continuous administration of salt solution by the bowel, and of the enforcement of Fowler's position, does not differ from that practised in the management of peritonitis following appendicitis, and will not be discussed here in detail. It is, however, of great importance to consider the advisability of removing the primary focus of the infection.

If the uterus has been perforated or lacerated, its removal is advised, provided the condition of the patient will permit. If it is evident that the patient cannot withstand so formidable an operation, a dam of gauze should be placed about the uterus. Where the infection has spread from the tubes, their removal is advised if the condition of the patient will warrant. A ruptured pus-tube should be removed. There is some difference of opinion as to the advisability of flushing the abdominal cavity with salt solution, but the consensus of opinion is strongly opposed to the practice. Where there is great distention of the bowel that is not relieved by drainage of the peritoneal cavity and by the usual means employed for the expulsion of gas, multiple punctures of the bowel may be made.

Fromme reported 12 cases operated for acute diffuse peritonitis. Six of this number were lymphatic invasions; all died. But 2 of the 12 cases recovered. These experiences do not condemn the practice of draining the abdominal cavity, but serve to emphasize the necessity of an early diagnosis.

We have a suggestion in the practice of Latzki who makes an exploratory abdominal incision early in suspected cases of peritonitis. Henkel advises an early exploration through the cul-de-sac and the taking of cultures from the peritoneum.

The prognosis depends much upon the nature of the infecting organism. If there is a gonococcus, or a mixed colon infection, the outlook is relatively good; if there is a streptococcus infection, the prognosis is bad.

Bumm drained 45 cases with recovery in 48 per cent.; Wormser 177 cases with recovery in 37 per cent. Latzki operated 47 cases of puerperal peritonitis out of a total of 125. Of the 51 cases not subjected to operation but two recovered; of the 47 operated 17 (24 per cent.) recovered. He observes that none of the cases with great distention of the bowel recovered. He makes a median incision from the umbilicus to the symphysis, one in either flank and four in the cul-de-sac, through which rubber drainage tubes are inserted. If there is great distention of the bowel, which is not readily controlled by eserine, he makes multiple punctures in the bowel.

In the fulminating forms of peritonitis no good can come from surgical interference. In the less virulent forms early drainage is imperative. This calls for an early diagnosis and suggests the advisability of making exploratory punctures and incisions.

CONCLUSIONS.

I would present for your consideration and criticism the following epitomes of the methods of treating puerperal sepsis:—

1. As yet we possess no reliable clinical or bacteriological guides in the early management of puerperal sepsis.

2. Operative treatment, when administered in a timely and skilful manner, can do much to prevent the extension of infections. But it is well to bear in mind that untimely surgical interference and the faulty application of surgical measures may be productive of much harm.

3. Retained placental tissue should be removed before the onset of septic infection. Membranes may be left to nature unless they protrude from the cervix or interfere with drainage. In virulent streptococcic infection, the infection-organisms may gain access to the blood through the wounds created in the act of removing the placenta; hence, in these cases, it is better to encourage the spontaneous expulsion of placental tissue by the administration of ergot. Failing in this the uterus must be emptied by mechanical means. The fingers are preferred to the curette or placental forceps. If, for anatomical reasons, the infected placenta cannot be removed, and no blood invasion or metastasis exists, hysterectomy may be considered.

4. Puerperal ulcers should not be curetted for fear of extending the infection.

5. If hysterectomy is to accomplish anything, it must be performed when the infection is confined to the uterus. Under these conditions, and in the presence of multiple abscesses of the uterine wall, of infected fibroids, of inaccessible placental tissue, of perforation of the uterine wall and possibly of infected appendages, hysterectomy is advised. It is questionable, without present endowments in diagnosis and prognosis, if we are ever justified in removing the uterus in the early stages of puerperal infection, while the infection is confined to the uterus, and in the absence of the above-mentioned complications.

6. The timely ligation of veins in puerperal pyemia may forestall a general infection; but as in hysterectomy it must be done before the development of a general bacteriemia and metastasis, and the infected thrombi must not extend beyond the common iliac vein, nor can it be bilateral to this extent.

7. The treatment of acute diffuse puerperal peritonitis is free drainage, the problem involved is that of early diagnosis.

8. Pus accumulations within the appendages, the parametrium or the pelvic peritoneal cavity, are seldom highly virulent and can therefore usually await the subsidence of the acute stage. In these cases, drainage should be established per vaginum, rarely through an incision immediately above Poupart's ligament.

THE MODERN TREND OF PSYCHIATRY.

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We stand at the threshold of a new and brilliant era in medicine. The wonderful advances of the last decade are but the forerunners of others which will unquestionably mark the end of empiricism and dogmatism. This advance has been general. Since the introduction of asepsis in surgery by Lister, the present generation has witnessed a succession of noteworthy innovations. Koch's tubercle bacillus, the antitoxin treatment of diphtheria, the treponema pallidum, the Widal diagnosis of typhoid fever, the value of tuberculin in the diagnosis and treatment of tuberculosis, the Roentgen ray, the vaccine therapy of Wright, the Opsonic index, the Wassermann reaction, the Flexner serum treatment for epidemic cerebrospinal meningitis, and Ehrlich's "606" are but a few of the discoveries which have followed each other with startling rapidity. But what of psychiatry? Has it kept pace with the other branches of medical science? Until recently there were no signs of any awakening or advancement. The psychiatry of Esquirol, Maudsley, Clouston, Regis, Blandford, and Krafft-Ebing with few variations and additions was not far removed from that of Pinel. Mania, melancholia and dementia with idiocy, imbecility, paranoia, and general paralysis of the insane constituted practically all that was known of insanity. Its etiology was very vaguely understood. General paresis was attributed to alcoholism, overwork and sexual excesses rather than to syphilis. Nothing was known of the pathology of the diseased brain, and interest in insanity was confined entirely to efforts at classification. This was based on symptomatology, pure and simple. Excitements were called mania, and depressions, melancholia, and there was apparently no desire to go any further into a field where speculation was considered idle. This condition of affairs pertained for many years, but finally evidences of dissatisfaction appeared and various investigators advanced entirely new conceptions of psychiatry. One of the first of these to really influence the profession was Kræpelin who was largely responsible for manic depressive insanity, dementia præcox, and involution melancholia. Kræpelin called attention to the fact that mania and melancholia frequently occur in the same individual at various times, often with frequent attacks but no tendency toward dementia or deterioration. This class of cases he grouped as manic depressive insanity and pointed out the special features which characterized it as follows: In the manic attack—elation, flight of ideas,

distractibility and psychomotor excitement. In the depressive forms—mental depression, difficulty of thought with dearth of ideas, retardation and motor inactivity. These cases recover, suffer from recurrent attacks and do not tend towards dementia as a rule. He showed that certain forms of depression characterized by anxiety, agitation, fear, restlessness, self-accusation, delusions of persecution, marked suicidal tendencies, etc., were common to the involution period and to these anxious depressions he restricted the term melancholia. Kræpelin's studies showed that certain cases of depression or excitement which have a tendency to terminate in dementia after one or more attacks have certain definite characteristics which he grouped together in his conception of dementia præcox. In this group he includes the diseases formerly described as hebephrenia, katatonia, and the cases described as mania and melancholia which terminated in dementia. He showed that these have certain definite characteristics which may be briefly summarized as emotional apathy and dullness, phantastic delusions, active hallucinations, mannerisms, negativisms, stereotopies, verbigeration, mutism, stupor, catalepsy, etc., ending eventually in dementia. This may be spoken of as a symptomatic prognostic classification, and is of extreme value as throwing a great light on the outcome of the psychosis. Given sufficient symptoms to warrant a positive diagnosis of manic depressive insanity or dementia præcox, we can fearlessly give a definite prognosis. Manic depressive cases recover, dementia præcox does not. This is a most important advance. It is not to be assumed, however, that a definite diagnosis is a matter of simplicity. It is often extremely difficult as many of our cases do not conform to these definite disease types. Kræpelin has made an indelible impression on psychiatry, not only on the continent, but in this country where his classification is now in almost universal use. In the meanwhile others have not been idle. Wernicke advanced an entirely new and different conception of insanity. He advocated the theory that all mental diseases are due to disorders of the associative functions of the brain in contra-distinction to disorders of the projection apparatus of the cerebrum, which connects the higher brain centers with the peripheral sensory and motor mechanisms and gives rise to nervous diseases. He thus puts psychiatry on a definite anatomical and pathological basis. These lesions may occur anywhere in the psychical reflex arc, in which he includes the psychosensory tracts or receptive mechanism, the intrapsychic tracts or elaborating mechanism, and the psychomotor mechanism. This conception of the origin of mental disturbances is interesting and attractive but lacks anatomical proof. It has not been generally accepted, although Wernicke has many followers and has done much towards encouraging further study.

Kræpelin assumed dementia præcox to be an autotoxic condition accompanied by certain definite changes in the cerebral cortex. This was based partially on theory and partially on the results of elaborate studies of the pathology of the brain by Nissl and Alzheimer. These dis-

tinguished pathologists have contributed very largely to our knowledge of the changes in the neurones and their significance. Although much has been accomplished in this direction we are far from a solution of the problem. Many of the changes in the brain cells have been shown to be entirely due to terminal conditions and these changes and alterations have been shown to assume definite forms. Thus what has been described as acute alteration is now known to be due merely to high temperatures, as in febrile conditions. Other definite types are grave alteration, a terminal condition, shrinkage (due to edema), rarefaction, the pigmentary degeneration of senility, and axonal alteration, a condition due to a degeneration or injury of the axone of the cell.

It was thought by many that the autotoxic origin of mental disturbances could be demonstrated by studies of the changes in metabolism. This led to elaborate researches in the study of the blood, urine, etc. Exhaustive investigation of the urine by Folin showed many interesting results, but did not accomplish what was hoped for. A study of blood-pressure in the insane brought out the interesting fact that pressure is decreased in excitements and increased in depressions.

To Nissl and Alzheimer we are largely indebted for a definite knowledge of the pathology of general paresis. In addition to the well known gross changes in the brain we find an infiltration of the pia arachnoid and vascular sheaths by lymphoid and plasma cells. Although occurring in other conditions the presence of plasma cells in these localities is almost pathognomonic of general paresis. In the cortex there is a neuroglia proliferation, a budding of capillaries with a great increase in vascularity, the presence of numerous satellite cells, rod or *stäbchenzellen*, a disturbance in the layers of the cortex, any or all of the characteristic cell alterations already spoken of and a degeneration of the nerve fibres. The etiology of general paresis has been an interesting field for research. The "bacillus paralyticus" of Ford Robertson was one of the earlier efforts in the direction which is now generally discredited. The discovery of the treponema pallidum of Schaudinn, improperly called the spirochæta pallida, and the demonstration of its definite connection with the etiology of syphilis, have had an important bearing on the study of general paresis. The Wassermann reaction has practically cleared up all doubts as to the relation of general paresis to syphilis, a relation which was suspected by many for years, although such a reputable authority as Kræpelin could find a positive history of syphilis in only 34 per cent. of his cases. The diagnosis of general paresis has been greatly simplified by our knowledge of the fact that the infiltration of lymphocytes in the meninges of the brain and cord can be demonstrated by an examination of the cerebrospinal fluid. Lumbar puncture was introduced by Quinke in 1890 and the researches of Widal, Ravaut, and Sicard have afforded us a definite method of demonstrating the presence of an increase of lymphocytes in the spinal fluid. The Fuchs-Rosenthal counting chamber

makes a quantitative determination of the increase possible. This has been of inestimable value in the diagnosis of doubtful cases. It has been demonstrated that there is an increase in the protein and globulin content of the spinal fluid in general paresis. We also know that while the blood-serum of cases of syphilis gives a positive Wassermann reaction, cases of general paresis give in addition a positive reaction with the spinal fluid. This affords us an important means of differential diagnosis between general paresis and brain syphilis which sometimes closely simulates it. The diagnosis of general paresis can now be definitely made ante-mortem by laboratory methods and its existence absolutely confirmed by post-mortem studies of the brain. The researches of Nissl and Alzheimer have also given us a knowledge of the pathology of cerebral syphilis. The Wassermann reaction has shown that general paresis is a parasymphilitic disease. The *treponema pallidum*, however, has not as yet been demonstrated in the cortex, the meninges, or spinal fluid in that disease. It is an interesting fact that the pathology of the brain in some cases of sleeping sickness, a form of trypanosome infection, is almost identical with that of general paresis. Both diseases give a positive Wassermann reaction and both are due to pathogenic protozoa. The pathology of other mental diseases is not so definitely understood. The general brain atrophy, the neuroglia proliferation, the presence of corpora amylacea, and an alteration in the neurones known as pigmentary degeneration, together with the so-called pinpoint foci of necrosis in the cortex, furnish us with a definite pathology of senile psychoses. Further than this, elaborate studies of arteriosclerotic and other organic diseases of the brain have greatly advanced our knowledge of pathology. Alzheimer's recent studies of the pathology of epilepsy, although not so well known, are well worthy of mention here. Careful studies of the cortex have also been made in imbecility and idiocy.

One of the results of Kræpelin's work has been largely to destroy the integrity of the psychosis known for many years as paranoia. Many of these cases are now looked upon as being paranoid (paranoia-like) types of dementia præcox, alcoholism, and senility; the percentage of actual cases of paranoia which was quite high formerly being now very largely reduced. Several new types of diseases have been added to our classification. One of the more important of these is known as Korsakow's disease, an alcoholic psychosis described in 1887 characterized mentally by profound amnesia with a peculiar tendency towards falsification of memory and fabrications, complete loss of orientation, and physically by pronounced polyneuritic symptoms. Adolf Meyer, in an article in *Brain* in 1901, called the attention of the profession to the importance of a terminal condition to which he gave the name central neuritis. This occurs in infective and exhaustive cases, in melancholia, dementia præcox, senile and other psychoses. It is characterized by a slight rise of temperature, progressive weakness, muscular tension and rigidity, inco-ordina-

tion, muscular twitchings, jactitations, a persistent diarrhea, profound exhaustion, and by a mild delirium or stuporous mental condition. There is a very characteristic lesion known as axonal alteration in the cells of the motor cortex. About 50 cases have been recorded.

Hysteria has been a subject of much study of late. In 1907 Janet at the Amsterdam conference described hysteria as a purely mental disturbance which he defines as "a form of mental depression characterized by the retraction of the field of personal consciousness and by the tendency to the dissociation and emancipation of ideas which by their synthesis constitute the personality." He believes the hypnotic state to be synonymous with hysterical somnambulism and both based on suggestibility. The cause he states as a "depression or exhaustion of the higher mental function with retraction of the field of personal consciousness and dissociation of ideas and functions." A characteristic feature of the disease is somnambulism or dream-like states in which the patient represents in reality another personality, oblivious to all outside influences and centred in his dreams. After this period there is a complete amnesia for all that has occurred. Somnambulist states characterized by some one predominating idea he speaks of as "fugues." Double or multiple personalities are only protracted somnambulist states, the characteristic feature being amnesia. To Janet, also, we are indebted for a description of the condition which he first termed "psychasthenia." This he describes as a disturbance of the feelings, the will and the perception. He includes obsessions, manias of doubt, tics, agitations, phobias, impulsions, the deliria of contact, states of anxiousness, neurasthenia, sensations of strangeness, and depersonalization. Psychasthenia has been defined by Meyer as "a lowering of general interest and tendency to rumination over what is accessible to the patient in his memory, but is not squarely met, and where the normal reaction is replaced by rumination, substitute acts and panics." This symptom complex includes many of the so-called borderland psychoses, seems to be based on fundamental features common to all such cases, and apparently has come to stay.

Perhaps no other form of insanity has attracted so much interest as dementia præcox or excited so much discussion. Kræpelin applied the name to certain types which presented characteristic symptoms, complexes usually resulting in dementia. Ziehen applied the name only to those cases showing evidence of actual deterioration. Bleuler describes the disease as being of organic origin with secondary features explained by the psychological studies of Freud and Jung, while the latter explains its features on a purely psychological basis. Adolf Meyer, before the British Medical Association in 1906, called attention to the underlying psychogenic etiology of the disease. He sees in the onset a culmination of an extended period of bad mental hygiene developing in individuals who are unable to adjust themselves to their surroundings. As a result of a perverted mental mechanism they are unable properly to meet the difficulties

of life. In the words of Campbell, "they are apt to brood over their troubles, to see meanings that are not intended, to neglect the ordinary balancing factors of a healthy life, beneath their ordinary daily activity there is usually a variety of internal discrepancies quite incompatible with that feeling of satisfaction which goes with good bodily and mental health." Analytical studies of the inner life of these individuals uncover disturbing factors which have resulted in faulty psychological reactions. This conception of the disease is an intensely practical one and suggests a modification and reconstruction of the mental habits of the incipient cases which may lead to an ultimate cure. Hoch, who has made elaborate studies of these individuals, finds that they are usually of what he terms a "shut-in" type, seclusive and introspective but subject to guidance and control under proper influences. We have here the suggestion of a new hygienic treatment of insanity which is destined, it is hoped, to accomplish much. If the mental habits and the surroundings of an individual are largely responsible for the onset of a psychosis we can look forward to accomplishments which may rival the success attained in the crusade against tuberculosis. This is the highest achievement of modern psychiatry and promises to give it a place with the other departments of medical science in the development of preventive medicine. It is worthy of note here that an effort in this direction has been made recently by the State Charities Aid Association. Not only have our ideas regarding the fundamental principles underlying the conception of insanity changed, but our ideas as to treatment as well. Attention has frequently been called to the fact that Pinel removed the chains and shackles from the insane. This is true and has often been pointed to with pride. Although Pinel removed the chains he did not abolish the use of restraint; and strait-jackets, strong sheets, wristlets, cuffs, straps, and other forms of mechanical restraint have been in vogue for centuries. It is only within the last decade or two that these methods have almost entirely been replaced by hydrotherapy and more humane and scientific methods of treatment. It would be highly improper to conclude a review of the recent progress in psychiatry without a reference to the influence of Sigmund Freud's psychological researches, which promise to be far-reaching in their results. His earliest work was done with Breuer in the study of hysteria. They advanced the statement that hysteria is always the result of a psychic trauma of which the patient himself has no recollection, but which lies buried in the subconscious strata of the mind. By means of hypnosis they demonstrated that hysterical symptoms such as anesthetics, paralyses, etc., were but the symbols of such latent memories. The essential mental mechanism here, up to a certain point, is only that common to the normal individual in the process of forgetting a painful or unpleasant experience. An unpleasant incident in a normal individual is disposed of by a reaction in the form of tears, laughter, profanity, anger, revenge, hate or some expression of speech, which affords an

emotional outlet of some kind. In hysteria, however, we have, according to Freud, a psychic trauma which has not been sufficiently reacted to. The pathogenic idea being a painful one and one which cannot be normally disposed of is rejected by the psychic censor and repressed into the subconscious, intentionally forgotten, but until it is reacted to in some way is not permanently disposed of and a compromise results. A memory symbol in the form of a paralysis or some other hysterical symptom replaces it, while the painful effect or emotion which accompanied it and caused its repression is forgotten. The relation between the memory symbol and the original etiological painful idea is usually clearly established by hypnotism. They found further that when the painful idea or experience which caused this disturbance was recalled to the individual and thoroughly discussed, the hysterical symptoms permanently disappeared.

An extended study of these psychic traumas led Freud to the belief that they always originated in connection with some painful sexual experience in the early life of the individual. Hysteria is thus the result of a conflict between the libido or sexual desire and the normal tendency towards repression of an idea which the psychic censor rejects as incompatible with ideas of propriety or morality. Hypnotism not always being a practical procedure, Freud substituted psychoanalysis. In the execution of this method what Campbell aptly describes as a "scientific confessional" is resorted to. The patient is requested to give a careful account of his troubles with the object in view of recalling the repressed painful experience. In carrying out this idea the patient relates the apparently irrelevant and senseless memories recalled, and these are frequently found to mask the real trouble.

Jung has adapted the association test as originally suggested by Sœmmer to the study of the subconscious. This is based on the fact that certain words or ideas in the mind of the average normal individual suggest certain other words or ideas in the great majority of cases. A stimulus word is mentioned, and the first word suggested constitutes the reaction word. The length of time intervening is spoken of as the reaction time. Freud found that when a peculiar reaction word was obtained, one that differed widely from that usually resulting or obtained only after great delay, it usually pointed towards some so-called complex. The peculiarity or the delay in the reaction was found to be due to the fact that it recalled some painful or repressed idea. He was thus often led to the discovery of the psychic trauma which caused the hysterical symptoms.

Freud found another important method of uncovering the subconscious in the study of dreams. He describes a dream as always being "the more or less disguised fulfilment of a suppressed wish." Even in dreams the psychic censor is active and we have two different activities in dream life, the latent and the manifest ideas. The manifest are those which are recalled on waking while the latent are those which are repressed and for-

gotten. The latent thoughts give the clue to the repressed wish. The importance of the dream lies in the fact that it represents the innermost thoughts of the personality. He divides dreams into three classes:—

- (1) Those which represent an unexpressed wish as fulfilled.
- (2) Those which represent the realization of a repressed wish in an entirely concealed form, and
- (3) Those which represent the realization of a repressed wish in a form insufficiently or only partly concealed.

Dreams accompanied by fear are of sexual nature. In neurotic individuals the dream very often refers to the origin of the neurosis, the repressed painful idea, but owing to distortions, symbolizations and substitutions is not recognized. According to Freud even the "hysterical symptom, like all other psychic formations, is the expression of a wish fulfilment."

It will be observed that Freud attaches great importance to the sexual. His ideas are fully expressed in his "Three Contributions to the Sex Problem." The point he emphasizes most strongly is that sexual instincts do not develop at puberty but exist from early childhood. Sexual tendencies are certainly manifested before the age of puberty, but few attach such an importance to the sexualism of childhood and infancy. Freud goes so far as to assert that the child sucks his thumb or fingers as an evidence of sexual longings which are first aroused by feeding at the mother's breast. This resulting feeling of satisfaction he construes as an element of the sexual sphere. In the psychoneuroses he believes the symptoms to be substitutes or symbols of repressed sexual longings which are radiated into the bodily sphere by conversion. All of the processes of repression of ideas according to Freud are manifested in the normal individual. In his "Psychopathology of Every-day Life" he follows this same line of reasoning in studying the psychology of the normal mind. He tells us that the ordinary process of forgetting occurrences is not so much a gradual fading of memories or impressions, as it is a repression of unpleasant ideas. He thus explains all of the common lapses of speech in the normal individual as well as the well-known tendency to forget names, etc. His theories are not only applicable to hysteria but have been applied to another important group of psychoneuroses, which he speaks of as *Zwangsneurose* or obsession neuroses. This includes all of the obsessions. These are explained by Freud as follows: A painful idea instead of being converted into a bodily symptom, as in hysteria, is relieved of its accompanying unpleasant emotions by detaching itself from the original cause and associating itself with some substituted and less unpleasant idea. He gives the following illustration. A young woman, who exhibited a great distaste towards reading or even touching books, was found to have read a story that recalled an unpleasant sexual experience which occurred when she was eight years of age and which she had forgotten. Compulsive movements he says are measures which tend to pre-

vent the recurrence in consciousness of unpleasant thoughts which have been repressed. This view throws a new and interesting light on what has been described as psychasthenia and would seem to be a logical explanation of its psychology. The prominence attached by Freud to the sexual brought his teachings into disrepute and they were not given the consideration they deserve until Jung applied his psychological methods to the study of dementia præcox. By means of analytical studies, psychoanalysis and the association test, he demonstrated the fact that the apparently meaningless mannerisms of dementia præcox are symbols or substitutes for complexes, which determine the symptoms of the disease. Complexes are groups of ideas associated with emotional disturbances. These complexes may retain their original character without any transformation. Complexes involving a feeling of deficiency and wounded pride give rise to suspicion and delusions of persecution. Unfulfilled longings may be gratified by being actualized and accomplished in the form of delirium or delusions of grandeur. Symbols and substitutes represent complexes which are antagonistic to the ego, and are therefore transformed and not recognized by the psyche. All of these are distorted manifestations of some repressed complex and can be discovered only by psychoanalysis, the analysis of dreams or by hypnotism. Jung's psychological studies of dementia præcox have, not only resulted in a much clearer conception of that disease, but have demonstrated the importance of psychology in psychiatry generally.

Our knowledge of insanity is far from being complete, but the inactivity of many years has been followed by an awakening which has led to exhaustive studies of mental disease from the standpoint of symptomatology, prognosis, pathology, psychology, and treatment. From each of these viewpoints our conception of psychiatry has entirely changed within the last few years, and the outlook is exceedingly hopeful.

ATYPICAL MASTOIDITIS.

By EDWARD BRADFORD DENCH, M. D., of New York.

While cases of typical mastoiditis are easily recognized, the atypical cases occur so frequently, that special consideration must naturally be given to cases of this character. The ordinary signs, such as local tenderness, narrowing of the fundus, or profound impairment of hearing, profuse discharge or a sudden cessation of discharge, with increased pain, or, in infants, a continuous elevation of temperature, associated with a profuse or moderate discharge from the ear, and unaccounted for by other conditions, are symptoms which we all recognize as an evidence of a mastoiditis. Unfortunately, however, these symptoms do not occur in a regular sequence, and experience seems to teach us that the presence of any two of these symptoms, may be sufficient to determine the necessity for operative interference, and, in some cases, only one of these symptoms may be present.

During the last four or five years, a large number of cases of atypical mastoiditis have come under my observation. In most of these, the condition characteristic of the process, was the appearance of the fundus of the canal. A pronounced sinking of the upper and posterior wall of the external auditory canal, or sometimes an elevation of the floor of the canal, in cases of considerable duration, has been the most constant symptom of a mastoiditis. Comparison of the lumen of the canal with that of the opposite side is of value in these cases. We are warranted in assuming that the conformation of the external auditory meatus, upon the two sides, will be similar, unless some pathological condition exists. If, then, we can exclude bony growths, or an inflammation of the outer portion of the external auditory canal, that is, a furuncle, any narrowing of the meatus upon one side is strongly suggestive of involvement of the mastoid cells.

In a number of cases, occurring in late adult life, this one sign has been the chief evidence of a mastoiditis. In some of these cases the hearing was profoundly impaired after a history of an acute otitis several months before. The impairment of hearing following an acute otitis, should disappear within a month or six weeks from the inception of the acute symptoms, and any profound impairment of hearing after this time, should make one consider seriously the possibility of involvement of the bony structures, even in the absence of other symptoms. If, added to this, we have a slight sinking of the upper and posterior wall of the canal, close to the drum membrane, and a persistent haziness of the drum

membrane, the impairment of hearing furnishes us a strong confirmative sign of the presence of mastoiditis.

In a number of cases, seen during the past year, a persistent otorrhea was the only evidence of mastoid involvement. A profuse otorrhea, persisting for from four to six weeks from the inception of the acute attack, and properly treated either by primary free incision of the membrana tympani or by late incision, if spontaneous rupture has occurred, followed by irrigation sufficiently frequent to keep the canal cleansed, always means involvement of the mastoid cells. In several cases which have come under my observation during the last eight months, this persistent otorrhea was the chief evidence of involvement of the mastoid. There was absolutely no tenderness in these cases, the temperature was strictly normal, the general condition of the patient was excellent, and a persistent discharge from the ear was the sole symptom, together with a considerable impairment of hearing.

In all of these cases, the simple mastoid operation revealed the cells filled either with pus or with large masses of granulation tissue. In a number of cases, the entire mastoid was completely destroyed, being converted into a large cavity filled with grayish granulation tissue, adherent to the sinus and cerebellar dura. In all of these cases a simple mastoid operation was sufficient to clear up the condition.

In certain other cases, there was a history of an acute otitis, of very moderate severity, several months before the patient came under observation.

In the above cases, the only symptom was profound impairment of hearing, a sinking at the fundus of the canal, and slight or absolutely no aural discharge. In these cases extensive destruction of the mastoid cells, in some instances, with fluid pus present, in others with the cells filled with granulation tissue, was found.

Another interesting series of cases has been observed in which, following a comparatively mild attack of acute otitis, with very little subsequent pain, a spontaneous cortical perforation had occurred at an unusual site, that is, on the posterior wall of the external auditory meatus. These cases very frequently simulate furunculosis of the canal. On three occasions, during the past five or six months, I have seen patients presenting this symptom, in which a differential diagnosis between a furuncle of the external auditory meatus, and a perforation on the posterior wall of the external auditory canal, due to mastoid involvement, had to be made. In one of these cases, the presence of a sinus, admitting a small probe to the depth of half an inch, rendered the diagnosis fairly certain. In this case, also, the presence of *streptococcus capsulatus* in the discharge, accounted for the lack of tenderness over the mastoid, and for the insidious character of the involvement. In another case, a smear showed a *streptococcus* infection, which made the diagnosis fairly clear.

In some of these doubtful cases, in which a narrowing at the entrance

of the canal made diagnosis uncertain, an *x*-ray plate of the mastoid has shown either a cloudiness of the mastoid cells, or, in one instance, practically a complete obliteration of the mastoid spaces by granulation tissue. In one of these cases, in which the *x*-ray plate seemed at first to be negative, it was found on a closer examination of the plate, after operation, that two small dark areas,—one over the sinus, and one far back in the mastoid region, near the emissary vein,—marked the exact location of granulation tissue at the time of the operation.

In doubtful cases, I have had *x*-ray plates made in a number of instances, and in practically all cases, we have found evidence of mastoid involvement in the *x*-ray pictures. I think, therefore, we have in the *x*-ray photograph a valuable means of confirming our suspicions in doubtful cases. We have not, as yet, experimented sufficiently along this line to be absolutely certain of the diagnostic value of this measure. In doubtful cases, where it has been employed however, it has certainly been of great value.

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CHRONIC RELAPSING GONORRHEA AND THE METHODS
USED TO DETERMINE ITS CURE.

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The ordinary manifestations of acute gonorrhea are familiar to every physician. As it becomes chronic and intractable the varied pathological conditions which cause it are not as well understood, and the results of treatment are therefore unsatisfactory to both physician and patient in many instances.

The writer desires to call attention most strongly to the important fact that chronic gonorrhea assumes two forms: the chronic continuous and the chronic relapsing; the former, a perfectly obvious condition observed easily by the patient or physician; the latter, most deceptive and dangerous because it may exist without discharge, without shreds in the urine, and without any obvious objective symptoms whatever. Yet with no apparent reason in these cases the discharge returns in an acute form, as capable of spreading the infection as it was at its onset, perhaps years before. If a patient has been unfortunate enough to have married during the interval, when he supposed himself to be cured, the sad results are far-reaching in their effects. Serious operations involving perhaps the removal of both Fallopian tubes, with sterility, as its best result and death from peritonitis as its worst; gonorrheal ophthalmia of the new-born with possible blindness of one or both eyes; the intense mental anguish of a man who has perhaps been the innocent cause of these catastrophes, make up the dreadful sum total of what may happen from this insidious enemy,—the relapsing form of chronic gonorrhea.

That these possibilities are not by any means unlikely or exceedingly rare is shown by the following cases, and also by the fact, to be later mentioned, that many patients who were supposed, from the absence of symptoms, to be cured showed an active growth of gonococci upon the culture medium.

Case I.—A young man, now thirty years of age, was infected with gonorrhea at the age of nineteen, which developed into a slight chronic discharge, for which he was treated by a specialist for a year and a half. He was told to wait six months and then report. This he did, and at this visit the specialist requested him to pass his urine in a glass, and, calling his attention to its clearness and freedom from shreds, told him to go ahead and marry. Acting on this advice he was married a few months afterwards.

There was no apparent discharge and the first child was born at the end of a year. Thus far no trouble had appeared in mother, child, or himself.

Two years later a second child was born and this one had marked gonorrheal ophthalmia of both eyes, which did not destroy the sight because its nature was at once recognized and vigorous treatment instituted. No symptoms of gonorrhea showed in the father or mother, except that the latter showed a slightly increased vaginal discharge during the last months of pregnancy.

Since then there have been no further symptoms of the disease in either parent.

This case well shows that something more is demanded from the physician than an ocular inspection of the urine. The time has now arrived when it is criminally careless for the physician not to use every scientific means to ascertain whether this disease is cured or not before he assumes the dreadful responsibility of exposing innocent wives and children to its dire effects. If this is done we will have fewer invalids and sterile women and blind babies.

Case II.—Frank K., twenty-eight years old, married, reported at the genito-urinary clinic of the Boston Dispensary on November 20th, 1910, with the following history. First gonorrhea nine years before, which lasted seven months and was apparently cured. Second gonorrhea, two and a half years ago, lasted for several months and then as he had no discharge for a year and a clear urine he supposed himself well. To be on the safe side he consulted two physicians, who assured him that there was no evidence of the presence of the disease and that it would be safe to marry.

This he did and within a very short time the disease relapsed, due to excessive coitus possibly. His wife was infected in an acute form and the baby was born with gonorrheal ophthalmia which destroyed the sight of one eye. Soon after the birth of the child the mother was taken to the hospital where a pus tube and ovary were removed. There had been no extra-marital coitus in this case. At the time of the visit he had a profuse purulent discharge, which contained many extra- and intra-cellular diplococci. This man, therefore, had what was practically an acute gonorrhea, starting from an uncured case which had remained latent more than a year.

Case III.—Charles X., twenty-four years of age, consulted the writer in June, 1892. He had had gonorrhea two years previous to his visit, but had been free from all symptoms for one year. Three weeks prior to his visit he was married and the discharge returned in an acute form. Within a few days his wife was infected. He showed a profuse purulent discharge containing many gonococci. Under appropriate remedies this cleared, and an examination of the urethra showed a stricture of calibre 19 F in the anterior portion. An internal urethrotomy was done; the

urethra was fully dilated, and the discharge never returned. An examination of the wife showed a profuse vaginal and urethral discharge, containing gonococci.

The fact that a recent rupture of the hymen was evident, and that the infection was evidently very acute, removed the obvious possibility that the disease had been received from her. As the disease was seen before the days of prostatic massage, no treatment along these lines was given. It shows the influence of recent and contracted strictures in the causation of a relapsing discharge.

Case IV.—M. M., twenty-three years old, consulted the writer on February 6th, 1911. His first gonorrhea was four years before and lasted eight months. He supposed himself well and was married in six months. In six months his discharge returned in a profuse and purulent form with left epididymitis, lasting two months, and was apparently cured by irrigation and by the passage of sounds. A child was born a year after marriage and showed no disease of the eyes. After the first relapse he observed no discharge except a little moisture after drinking beer. Three weeks ago he developed a markedly purulent discharge and, within a week, left epididymitis. At the time of his visit there was a purulent discharge containing many gonococci and his left epididymis and vas deferens were markedly swollen and very tender. Because of the acuteness of the symptoms, no local examination has been made, but it is reasonable to assume that the focus of infection may be found in the vesicles. His wife has a severe leucorrheal discharge, frequent attacks of pelvic pains and attacks of rheumatism which do not yield to remedial means. There had been no extra-marital coitus in this case. The writer recognizes that this report is necessarily incomplete, but its recent occurrence, so well illustrating the subject under consideration, seemed to warrant its inclusion among the illustrative cases.

Case V.—A man of forty-nine, referred to me by the courtesy of Dr. Jonas E. Bacon. His first gonorrhea was contracted twenty-five years before, and became chronic. It was treated for five or six years and the slight remaining watery discharge disappeared by the use of atropine internally. No visible evidence of the disease was present until two years before his visit to me when he had marked frequency of urination with terminal spasm. The urine was very cloudy, but there was no urethral discharge. A culture of the massaged secretion showed gonococci, as did also a slide made at the same time. Following this massage, a sharp attack of left epididymitis occurred. He was treated after the subsidence of the epididymitis by massage, dilatation and instillation, but an examination four months later showed gonococci still present in both slide and culture. For the past year no gonococci have been found and he has had no symptoms. Examination shows a clear urine with no shreds. A 28 sound passes easily to the bladder. By the Swinburne urethroscope the urethra was found to be normal with possibly a slight congestion of

the prostatic portion. There was no residual urine in the bladder, prostate was normal, vesicles slightly enlarged; most marked on the left. Three cultures of massaged secretion showed no gonococci.

This case is most remarkable because it shows the presence of gonococci twenty-three years after the disease had been contracted and eighteen years after the disappearance of all symptoms.

Many other such cases have been seen by the writer in his private and dispensary practice during the past twenty-two years, but further repetition of the essential facts is needless and does not strengthen the case. That they occur is shown by the records of every hospital in which pelvic surgery in the female is done, and it is absurd to suppose that all these cases of pus tubes in married women are caused by the post-marital sins of the husbands, and it is equally absurd to say that a man would marry when there was any visible evidence of the disease. Therefore, they must be caused by a hidden gonorrhea which gives no external signs of its presence until some exciting cause brings on a relapse.

A fact, perhaps not so well known, is that the symptoms produced by infection from a very chronic case may not be as violent as when acquired from a recent case and therefore not as quickly recognized and treated. As a result, a gradual extension to the uterus and tube takes place producing the common gonorrheal endometritis and salpingitis, without any recognized active vaginal or urethral symptoms. In fact, infection of the female urethra is the exception in these cases.

The same difference in severity of symptoms is observed in the eyes, those acquired from a chronic gleet being far less severe.

To outline the pathological conditions which cause the chronicity of this disease, to indicate the modern methods of treatment for its relief, and above all to describe the means of ascertaining when it is cured, are the objects of this paper. Special emphasis will be placed upon the examination by culture of the material obtained by prostatic massage and vesicular strippings.

DIAGNOSIS.

In order to bring about a cure of this ailment it is necessary for us to ascertain from what part it originates, or we are quite unable to apply the treatment intelligently or effectively.

A careful history of previous attacks should be obtained, as well as of other venereal diseases. The question of previous sexual excesses is important as the gonococci may be implanted in a prostate already mildly inflamed from other causes. Complications, which have occurred, are important to note; if the patient, for instance, has had one or two attacks of epididymitis one can be sure that the vesicle did not escape and may now contain the focus of infection. Attacks of frequent urination with terminal spasms or hematuria show involvement of the posterior

urethra or prostate. The freedom of urination, the size of the stream, incontinence or retention, should all be noted.

We are now ready for the examination of the patient himself and the penis should be inspected for the presence of visible discharge. If present it should be smeared on a slide and fixed by heat for future inspection. Examination of the urine is the next logical step in our investigation. From the days of Thompson till to-day, it has been traditional to ask the patient to urinate in two glasses and then to compare the contents of these. This is of value in acute or subacute cases where there is sufficient discharge to flow back into the bladder and thus cloud the urine from its pus content, but to use it in the average chronic case and expect it to yield valuable results is as absurd as it is useless.

In these chronic cases we do not commonly have a profuse discharge, but merely a small amount lying upon the surface of the urethra; therefore, it does not enter the bladder at all. The first glass then will contain all the material which has been washed out of the whole urethra, both anterior and posterior, and does not in the least give us any information as to whether it came from in front of or behind the compressor urethræ muscle: the point of division between these two portions.

The exception to this, as I have already stated, is in those cases of profuse chronic discharge, when the pus has become mixed with bladder urine. Such cases are self-evident general infections. But the test for localization depends upon certain floating particles in the urine, the so-called shreds, and in finding out in what part of the urethra they are found in greatest number. We must substitute for the venerable and respective two-glass-test a more recent and accurate method,—the four-glass-test.

To wash out that portion of the urethra in front of the compressor muscle, we should use a 2 per cent. solution of boric acid, or normal salt solution, and should select a large hand syringe or gravity apparatus in which to use it.

With a rapid and rather forcible dilation of the urethra to insure a sharp contraction of the muscle, the anterior portion should be well flushed out with eight to twelve ounces of fluid. This should be placed in a receptacle and labeled "glass one," representing the washings of the anterior urethra.

The patient now urinates in two glasses, the first of which (glass two) will represent the urinary washings from the posterior urethra, while the second (glass three) the bladder urine and whatever material it may contain.

If empty, the bladder should now be filled with boric acid solution and the prostate and vesicles should be thoroughly massaged. As this solution is passed (glass four), it represents what has been expressed by massage.

This test is not of very great value, but such usefulness as it has depends upon the accuracy with which it is carried out.

Our next step should be carefully to inspect the genitals, to palpate the testes and epididymes to see if any nodules are present as evidence of previous and perhaps forgotten attacks of inflammation, and to examine for varicocele or small hydroceles.

This done we should proceed to our examination of the urethra to see whether there is present that most frequent cause of chronic discharge,—a narrowing of its calibre in one or several points, producing a urethral stricture. For this purpose the bulb-pointed bougie is used,—the *bougie-a-boule* as it is called, and the largest size which the meatus will admit is to be selected, and passed gradually and slowly down the canal to the bulb. If obstruction is met with at any point through which the size selected will not go, the next smallest should be tried, and so down the list until one is found which will pass.

Note of the calibre and depth of all strictures should be kept as well as their sensitiveness and the bleeding produced. Bearing in mind that the normal calibre of the male urethra is 30 F, and the normal meatus 24 or 26 F, we may be reasonably sure that if a 28 or 30 *bougie-a-boule* passes freely there is no stricture. Any tender spots should be carefully recorded for future urethroscopic examination.

Having thus examined the anterior urethra, we must now determine whether there is a stricture of the deep urethra. For this purpose the urethral sound should be used, beginning with 23 F, and if 28 F passes fairly freely there is no stricture worthy of consideration as a cause of chronic discharge.

In the absence of stricture the urethra may be examined with the urethroscope (about which more will be said later) and the general appearance of the mucous membrane inspected as well as any localized areas.

The prostate and vesicles should be next examined by rectum, and their size, consistency and sensitiveness determined. From many such examinations the fact has been established that both chronic continuous and chronic relapsing discharges are due to three chief causes,—urethral stricture, chronic vesiculitis and prostatitis. Other contributory conditions may also be present,—cowperitis, folliculitis, as well as general urethral inflammation, but they are usually of secondary importance. Chronic infection of the epididymes and vasa deferentia may be a causative factor in certain cases.

TREATMENT.

This must be varied to meet the various conditions presenting themselves at the time the patient consults us.

If a profuse purulent discharge is present it should be first examined for organisms, and if they are found no local examination should be made until we cause the discharge to become less or at least free from gonococci.

For this purpose we should use the ten-minim-capsule of sandalwood oil, taking care to prescribe a reliable preparation on account of the frequent adulteration of this drug. Four of these should be taken daily. Locally the injection three or four times daily of 4 per cent. argyrol, 1 per cent. novargan or $\frac{1}{2}$ per cent. protargol. The discharge ceasing temporarily under this treatment, we may proceed to our examination as above outlined.

As these two causes of chronic discharge are responsible for the largest number of such cases, the two general principles of treatment should be a thorough dilatation of the urethra and frequent and persistent vesicular strippings and massage of the prostate.

First, as to the urethral dilatation: For this purpose there are three instruments,—the flexible bougie, the curved urethral sound and the Kollmann dilator, each of which has its value in the varying conditions which may be present. If the stricture is less than 20 F in calibre it is a safe rule to use a flexible bougie. The tissues about a stricture are usually soft and easily injured by a rigid instrument like a small sound, and through the laceration thus produced pathogenic organisms may enter the circulation. Severe chills and other symptoms of septic infection—the so-called urethral fever—may ensue. Such cases have been seen by every genito-urinary surgeon, and while they may be mild they may also be severe and cause death. The three following cases well illustrate the latter.

Case VI.—A man of forty-two, seen in consultation with a medical colleague had long been the subject of a deep urethral stricture which had been treated by external urethrotomy several years before. From his own neglect it had closed down and was causing a slight urethral discharge and moderate difficulty in urinating. Dilatation was attempted with an 18 F sound which passed with some difficulty, and was followed by considerable blood. No force was used by the physician. The following day he had a sharp chill with a temperature of 103° F. These repeatedly occurred and in spite of constant treatment assumed a chronic form with a chart of septicemia. He gradually failed, the chills were of daily occurrence and were followed by profuse perspiration and weakness of the heart action. A large slough, more than eight inches in diameter, formed in the sacral region under which could be seen the sacrum. Death occurred in eleven weeks after the sound was passed. No focus of pus was present but he died from general sepsis.

Case VII.—A man of fifty-two was the subject of a relapsing discharge caused by a stricture of small calibre, usually quite easily dilated by a soft bougie to 14 F. His physician dilated him with a steel sound up to 20 F, and considerable blood followed. The next day he had a marked chill with high fever following it. Mild delirium ensued and death occurred on the fourth day after the sound was passed.

Case VIII.—A man of thirty-four, who had recovered from a chronic

gonorrhea under treatment by sounds and irrigation, was the subject of a spasmodic stricture which required occasional dilatation. The usual size of sounds, 23 and 25 F were passed, and it was noted that the last one went in with some resistance, and that after its withdrawal a little blood followed. He was attacked at 9 p. m. with chills and vomiting for which appropriate treatment was given. He grew rapidly worse, the temperature rose to 104° F, the pulse became rapid, acute delirium set in and he died at four o'clock of the following day,—just twenty-three hours after the sound was passed. The autopsy showed a slight linear tear of the membranous urethra and general septicemia. There was no disease of any organ nor was the patient an alcoholic.

To avoid such disasters as these it is absolutely important that irrigation of some antiseptic solution should invariably be used after any instrumentation in the urethra. For this purpose the writer has used for several years a 1/4,000 solution of nitrate of silver, washing first the anterior urethra and then filling the bladder by gravity or by using a sterile catheter. If this is used even a slight chill is exceedingly rare.

An exception to this rule of using a steel sound below 20 may be found in these resistant strictures of small calibre when dilatation is exceedingly difficult by a soft instrument. Here we should use the small sound which has a thread to which may be attached a filiform bougie which serves as a pathfinder. As the sound readily enters the stricture no laceration results. The writer's perfected instrument, which has been made for him by Eynard of Paris, will be described in another article, but is briefly referred to here to call attention to its great value in such cases.

When the urethra has been dilated to 20 F the conical steel sound should be used.

The technique of using these instruments is known to every physician, but for safety and comfort of the patient three precautions should be used—namely, cleanliness, gentleness, and plenty of time. If these points are always kept in mind there will be less fear on the part of the patient and he will not be so ready to desert the physician as he now is because "he prefers the disease to its remedy." It is always well to use one or two sizes smaller than the one which is really the dilator, for this serves to lubricate the passage and makes the second sound enter very easily. Two sizes only should be used at one sitting.

Should the meatus be too small it can be enlarged by cutting it upon the floor with a small blunt pointed tenotome or eye knife. Ten per cent. solution of cocaine should be applied on a small swab and followed by suprarenal ointment, which stops any bleeding. The writer's short meotome has been found by him to be an exceedingly useful and accurate instrument. To check the hemorrhage suprarenal solution may be used, but most marked and quick hemastatic action has been found by the use of thrombo-kinaise, the ferment developed by Dr. Lawrence W. Strong of the Manhattan Ear, Eye and Throat Hospital, New York.

When the urethra admits readily a 28 to 30 sound it may be considered dilated so far as any stricture is concerned, but it should be kept in mind that dilatation is not only used for strictures but for other pathological conditions which tend to keep up a chronic discharge. These are an atonic condition of the mucous membrane, infection of one or many follicles, and the involvement of the mucous glands of the prostate. For these the sound does an incalculable amount of good. Where no stricture is present and the region of the prostate only needs dilatation, the Kollmann dilator has its greatest value. This four-bladed dilator with a Guyon curve has a fixed calibre in that portion which rests in the meatus, and it may be used where this is too small to admit large sounds. The rubber cover should be carefully sterilized before using. This instrument has little or no value in the dilatation of strictures, but finds its greatest usefulness in chronic prostatitis. Dilatation should be done two or three times weekly according to the tolerance of the urethra.

When the gonorrheal organisms pass beyond the compressor urethræ muscle and enter the posterior urethra we have many and serious complications. Unfortunately for its victim this happens in from 70 to 80 per cent. of all cases. The reasons for these grave dangers can be seen at once when we recall the anatomy of this region. The urethra here is of large calibre and is surrounded by the prostate gland. On its floor is to be seen, on the middle line, an elevation of varying size, the verumontanum. At its apex there is an opening, the sinus pocularis, or utriculus masculinum as it is sometimes called, in the lateral walls of which are the openings of the ejaculatory ducts. On either side of the verumontanum are the prostatic sinuses into which empty the prostatic ducts.

The ejaculatory ducts are three-fourths of an inch in length and pass through the prostate gland and enter the seminal vesicles on either side. These two organs are of the greatest importance in the causation of chronic gonorrhea, and consist of two lobulated pouches which are attached to the base of the bladder. Behind them is the rectal wall. Each vesicle is about two inches in length and three-fourths of an inch in width, and lies in close proximity to the prostate, forming on either side a slightly obtuse angle to a horizontal line drawn through it.

On section the vesicle is apparently composed of a series of convoluted canals having no general direction, but on careful dissection they are found to have a somewhat pyriform arrangement, the apices ending in the ejaculatory ducts. They consist of three or four large canals into which empty others which end in blind pouches or diverticula. This honey-comb structure, as it may well be called, explains the chronicity of this disease and also the difficulty we find in curing it.

The accompanying photographs from dissections made for me at Tufts College Medical School show most beautifully these points of structure.

The vas deferens enters the vesicle on its inner side at the juncture of

the ejaculatory ducts with which it forms an acute angle. At its lower end it becomes larger, forming the ampulla of Henle separated by a small valve from the cavity of the vesicle.

It can readily be seen that when this disease involves the deep urethra it may extend in several directions, upwards to the bladder and pelves of the kidneys, laterally into the prostatic ducts, and by the ejaculatory ducts to the seminal vesicles, epididymes and testes.

It may also penetrate deeply into the substance of the prostate.



Fig. 1.



Fig. 2.

Fig. 1.—Subacute gonorrheal vesiculitis, Museum Tufts College Medical School.

Fig. 2.—Same specimen with the vesicles laid open showing masses of purulent material.

The treatment for the chronic form of such extension to the prostate and vesicles is dilatation and massage with vesicular stripping. The former we have already considered, which brings us to the latter and most important procedure.

It is to Eugene Fuller that the profession owes much for teaching us the importance of this, as well as the frequency of seminal vesiculitis. Previous to 1893 this method of treatment was practically unknown; to-day it is used over the civilized world and has cured many thousands.

The most common descriptive term which is applied to this form of treatment through the rectum is "prostatic massage," but from this I wish to dissent. It implies that the benefit to be derived comes from its effect upon the prostate, which is not at all the case. If anyone will carefully examine the post-mortem appearance of these two organs he will see that the prostate is about an inch thick and is very firm and resistant in structure. Therefore, it is practically impossible for force applied through the rectum to its posterior surface to affect the inflamed glands in its anterior or urethral surface. This might be done were some solid body, like a sound, in the urethra, but this is obviously impractical and unsafe. Most of the good which is done by this valuable procedure is from its effect upon the vesicles.

In many cases of prostatitis with boggy enlargement of the gland much good is done by massaging it, but this condition is not as frequent as the vesicular involvement.



Fig. 3.
Normal seminal vesicles.

As I have found that this form of massage is not well understood by the average physician whose time is occupied by other lines of work, I consider it worth while to describe it somewhat carefully.

To find a position which is comfortable for the patient and convenient to the operator and yet permits free access to the affected parts is not easy. As a result of many experiments the following has been selected. The patient should remove his outer clothing and should push the trousers down to the ankles. The shirt should also be rolled up as far as the lumbar region. An ordinary stool with an elevation of twenty-two inches should be used and upon this the patient should lean, resting his weight upon the forearm and elbows. The feet should be well apart with the toes about a foot from the stool. The legs should be bent at the knees to relax the muscles as much as possible; and only one who has done massage many times can appreciate how much aid this position is in rendering the vesicles and prostate accessible to the finger. When it is desired

to save the massaged secretion for microscopical examination, the patient can hold with one hand a small Petri glass below the end of the penis.

The operator should always wear a rubber glove which should be well lubricated, as should also the external surface of the skin about the anus, which renders the introduction of the finger very much easier.

Standing at the patient's left the operator should place his left hand over the pubes and gently insert the index finger of the right through the anus into the rectum. As this is entered there is felt directly in front the rounded posterior edge of the prostate with the depression between the two lobes. As his finger becomes trained he will soon feel on either



Fig. 4.

Large mucoid mass expelled by vesicular stripping.

side the soft masses of the vesicles extending in an upward and outward direction for an inch and a half to two inches. In fat subjects the thickness of the perineum prevents palpation of the upper ends of these, but in most cases it is easily done. One should proceed in a methodical manner in carrying out this procedure, remembering that the object is to gently press upon the vesicles to expel their contents, and also to do what is possible in the way of massaging the prostate. Therefore, it is well to begin upon the right side and reaching up as far as possible to bring the finger down to the median line of the prostate. The next movement should be a little more to the left and so on until the whole right side has been treated. The left side should be similarly gone over.

The movement to be used is a combination of flexion and pressure of the first joint of the finger, the latter of which can be increased as the condition of the tissues permits. It should be done very gently at first because the patient fears it, since it is new to him, and because there is a possibility always present of starting up an attack of acute epididymitis.

About fifteen of these gentle movements should be used and they can be increased to about eighty or even more later.

The bladder should be full of urine or boric acid solution. I think well of the suggestion of my colleague, Dr. Henry J. Perry, that before the massage the patient should pass about two inches of urine in a glass. This is saved for comparison with the urine passed after massage. A frequent and annoying feature of these cases is the inability to urinate after massage, due to reflex nervous influences, but by allowing the patient to be by himself a few minutes this is usually overcome. Most patients after a few treatments will do all right in this direction. The material which is expressed may be in large amounts so that it drops freely from the meatus, but in others nothing at all appears; and between these two extremes we find all grades. This expressed material should be saved on a slide or Petri glass as before advised.

When the urine is passed into a glass we find the same marked differences in the material which it contains. The most striking result is the appearance of many large white flakes which sink quickly to the bottom. These are almost pathognomonic of a vesiculitis.

Again we notice large mucoid strings which remain suspended in the urine or solution for a long time. One of the most striking examples was seen at the genito-urinary clinic in November, 1910.

Case IX.—Italian, thirty-four years old, appeared at the Boston Dispensary for the treatment of his chronic gonorrhea which had existed for a year. As he passed his urine in two glasses for quick comparison it was noted that the first was fairly clear but the second was very cloudy. As this indicated that the muscular effort of emptying the bladder apparently squeezed out purulent secretion from somewhere, an examination of his vesicles was made, and a very large amount of a ropy mucoid material was expressed, which is very well shown in the photograph here produced which was taken half an hour afterward and shows the suspension of these masses still present. Several massages at different times yielded similar results.

The urine after massage usually has an opalescent appearance whether any material is present or not. After several treatments the flakes disappear and all that may be found in the urine is occasional shreds of varying size. The presence of a white fluid at the meatus is of no significance whatever, for it may be normal prostatic and vesicular secretion. The microscopical examination and cultures of this are, however, matters of the greatest importance and should be done in every case.

IRRIGATION.

After both dilatation and massage the urethra and bladder should be irrigated. For this purpose nitrate of silver 1/4,000, permanganate of potash 1/3,000, or 4 per cent. solution of boric acid may be used. Of these the silver is best for the average case. Where there are other organisms present, as in cases of stricture, the oxycyanide of mercury 1/4,000, is invaluable, but it is useless in cases of gonorrheal inflammation alone.

We may irrigate the urethra and bladder in one of three ways,—by the gravity method, by the hand syringe, or by the catheter. Each has its advantages in the varying conditions present.

To make quickly a percentage solution, the writer has found it very convenient to have stock bottles on hand which may be diluted as required. For example: a solution of nitrate of silver made with 7.29 grains of silver to a drachm of water, permanganate of potassium 7.29 grains to two drachms, and of oxycyanide of mercury 7.29 grains to three drachms of water. The variations are because of the varying solubility of the three. To make the weaker solution for irrigating, one, two or three drachms, according to the one desired, may be added to 500 c.c. or one pint of water and this makes a solution of 1/1000.

Sol. Nitrate of Silver	Sol. Potassium Permanganate	Sol. Oxycyanide of Mercury	
3† (7.29Grs)	3‡ (7.29Grs)	3‡ (7.29Grs)	To 500cc (O†) = 1-1000.
" "	" "	" "	" 1000cc(O‡) = 1-2000
" "	" "	" "	" 1500cc.(O‡) = 1-3000
" "	" "	" "	" 2000cc(O‡) = 1-4000
" "	" "	" "	" 2500cc(O‡) = 1-5000
" "	" "	" "	" 3000cc(O‡) = 1-6000
233.28 Grs To - 4-Ozs.	Do to 8-Ozs.	Do. to 12-Ozs.	

This table makes the subject perhaps clearer and is useful for office work. Some years ago I used a solution of iodine for irrigation and have recently made careful investigation along this line.

It is too soon to say just what strengths are best for different cases, but I am sure that this method has a great future in chronic prostatitis, both as an irrigation and for instillation. It is usually well borne and future experiments will be made to ascertain just what strengths are required in the various conditions.

Churchill's tincture in weak solution is the form which I am now using.

INSTILLATION

Where a stronger and more local action is desired nitrate of silver in 1, 2, or occasionally 3 per cent. solution may be applied to the posterior urethra by the Keyes-Ultzmann deep urethral syringe. Ten to twenty drops may be used. Marked frequency of urination with vesical tenesmus results at once and lasts about an hour. Occasionally blood follows the use of the stronger solution. The patient should be told that these symptoms will result. Sterling silver tubes should be used and cheap syringes avoided as they decompose the solution and cause endless trouble.

URETHROSCOPY.

In certain cases of infected follicles and in localized areas of chronic urethritis marked benefit is derived from the direct application of solution of nitrate of silver in strength of 20 to 60 grains to the ounce. By the urethroscopic tube, which has a small electric lamp fitting into a sub-tube in its lower surface, we are able to bring the whole urethra under inspection. If it is desired to examine the deep urethra, the Swinburne curved prostatic instrument works very well indeed.

Occasionally the open mouths of these follicles may require cauterization by the galvano-cautery or incision by a small Kollmann knife. A chronic folliculitis with repeated abscess formation is a well-recognized cause of chronic relapsing gonorrhea and should be removed by careful dissection when present.

A chronic inflammation of Cowper's glands is a condition which is more generally present than is usually described, and often ends in abscess formation. These small glands are situated in the folds of the compressor urethræ muscle and open on the floor of the bulbous urethra by a small duct one and a half inches in length.

After a course of treatment the question arises, is the patient well? To answer this question it is necessary to apply certain tests and see if we can find gonococci. The first and most obvious is to examine for visible discharge. If present it should be viewed with suspicion even if it is only mucous. If purulent, even without gonococci, further active treatment should be carried out. If no visible discharge can be found we may permit the patient to drink beer and other alcoholic drinks and watch for relapses. If the patient has coitus he should use a rubber condom to avoid re-infection from other sources, or infecting others. If no discharge follows these tests, we should now excite a chemical discharge by the use of an irrigation of nitrate of silver 1/3,000, and the instillation of 1 per cent. solution of the same. Previous to these a full-sized sound should be passed to distend the urethra and open the mouth of the follicles. The discharge resulting should be examined microscopically with great care. This provocative method should invariably be used.

The urine must be free from shreds containing a large amount of pus. Those of mucus or epithelium have usually no significance.

The prostatic and vesicular secretions should be expressed by massage and examined.

Having found nothing to indicate the presence of gonococci thus far we should now proceed to make our final test, the examination of the expressed vesicular and prostatic material by culture.

The writer is under the greatest obligation to his colleague, Dr. A. C. Pearce, for his patient and careful investigation during the past three years, and the larger portion of this description of our methods is from his records.

The discovery of the gonococcus by Neisser in 1879 was the first step in unravelling many obscure conditions which are now recognized as direct extension or metastatic infections due to the gonococcus.

The next step in advance was made by the discovery of a suitable culture medium by Bumm in 1887. Since that time a vast amount of work has been done on the gonococcus by various observers all over the world. Many statistics have been compiled by urologists and gynecologists in reference to the prevalence of gonorrhea and the length of time the gonococcus may lie dormant in the genito-urinary tract without giving rise to any symptoms.

We therefore accept as proven that gonorrhea is responsible for 40 per cent. of all cases of blindness in this country, 80 per cent. of gynecological operations, and that 60 per cent. of infected women; and a large percentage of infected men are sterile. Sexual neurasthenia and impotence are of common occurrence and result directly from chronic gonorrhea. These statistics can be greatly lessened in the future if gonorrheal patients are made to realize the dangers of latent gonococci and precise methods of examination for the presence of the gonococcus are followed in every case.

The difficulty of detecting hidden gonococci is due to the complex anatomical structures involved, the fact that gonococci may lie quiescent for months or even years without giving rise to any symptoms, and the difficulty of reaching their hiding places in the glands of Littre, Morgagni, Cowper, in the prostate, the epididymis, the vas deferens and ejaculatory ducts.

Another difficulty in detecting gonococci is met in the variable cultural characteristics. Three years ago we undertook to cultivate the gonococcus from the urine and massaged secretion of the seminal vesicle and prostate gland, using essentially the method laid down by Young of Baltimore. The cases were taken from private practice. The difficulty of obtaining suitable culture media has yet to be solved, *i. e.*, a medium that will grow the gonococcus under varying conditions. From time to time various media have been recommended, among them being Loeffler's blood-serum, hydrocele agar, ascitic fluid agar, chest fluid agar, Marmorek's human blood-serum and Guanieri's solidified blood-serum.

When it is desired to cultivate the gonococcus on a large scale it is

easy to realize that human blood-serum cannot be used although it is the most satisfactory. The problem was finally solved by using rabbit's blood to furnish the albumin content. The blood was obtained in a 30 c.c. syringe with a long needle, such as is used in tapping veins in the forearm, and doing a cardiac puncture, which does not disturb the rabbit in the least. A fair-sized rabbit will yield 60 c.c. of blood without any ill effects. This blood is mixed in the proportion of one part blood to two parts nutrient agar. The nutrient agar was prepared by extracting one pound of lean beef by immersion in 500 c.c. of cold water for twenty-four hours, then bringing it to a boil and skimming the surface. Then 40 grams of agar were added, 10 grams gelatin, 20 grams peptone, 3 grams sodium chloride and 1 litre of water. Titrate 8/10 per cent. acid to phenolphthalein.

The growth of the gonococcus even on the most carefully prepared media is uncertain because of its slight vitality outside of the human body. It is easily destroyed by the slightest variation in temperature, even one or two degrees being sufficient to kill it. Some strains grow almost luxuriantly, others not at all. This has led some observers, as Torrey and Teague, to believe that the gonococcus species is made up of several races and may be divided into several different types.

Watabiki (Tokio) in his studies on carbohydrate media could not get the same results and does not think gonococci are of different types. Maltschonoff, Bruckner, Oppenheim and others in their studies upon gonococci and agglutination, precipitation and complement binding method, are not ready to accept the existence of differential characters, or types, of the gonococcus.

Watabiki uses a medium composed of peptone 10 grams, sodii chloride 5 grams, aq. distil. 1,000 c.c., to which he adds equal parts of horse serum.

Rabbit's blood, ascitic fluid, human blood-serum and Robert's blood-serum were used in this series of cases to furnish the albumin for the culture media. Hydrocele fluid has proved unsatisfactory in our hands.

All media should first be tested by planting with fresh gonorrheal pus, as growing the gonococcus from a fresh case with profuse discharge is a simple matter compared to cultivating the gonococcus from strippings obtained by massage from the vesicles and prostate. The obstacles in cultivating the gonococcus in the latter cases are due to the difficulty of obtaining sufficient material to work with, contamination from the urethra in spite of every precaution taken, and the slight vitality of the gonococcus outside the human body. The rapidity with which contaminating bacteria overgrow the surface of the tube necessitates constant vigilance. We have experimented with the gonococcus in relation to the use of animals as a culture medium.

In our experiments gonorrheal pus did not produce the slightest disturbance in the eyes of rabbits and guinea-pigs. Neisser, Loeffler and others got negative results in inoculating the gonococcus into the eyes, urethra, joints and peritoneum of guinea-pigs, rabbits and dogs. You-

mans claims successful results in inoculating gonorrheal pus into the eyes of guinea-pigs, but his results, to our knowledge, have not been confirmed by other observers. The use of animals to detect hidden gonococci would be of the greatest assistance to the genito-urinary specialist and would be the means of preventing much human misery and many mistakes that are now unavoidable.

In a large number of our examinations we have found it an advantage to use the patient's own blood obtained from the ear and drawn into small test-tubes. This was mixed with the nutrient agar, already described, to which rabbit's blood had not been added.

ROUTINE EXAMINATION.

The patient is instructed to hold urine three hours at least before reporting for examination. Any discharge appearing at the meatus is obtained on a slide and cultures on blood agar also made. A thorough washing of the anterior urethra with warm sterile water, at least one gallon, is given. The patient then passes his urine in clean glasses; the urine is then centrifugalized and the contained shreds and pus fixed on a cover-glass and stained for gonococci. The bladder is filled with warm sterile water, the glans penis cleaned with soap and water followed by alcohol, a few drops of which are allowed to enter the meatus, causing a slight temporary burning. The index finger of the physician, being well lubricated, is introduced into the rectum and immediately comes in contact with the prostate. Running off to the right and left the vesicles may be felt.

In order to get the best results in massaging the vesicles it is well to bear in mind the anatomical position and the peculiar honeycomb arrangement of the vesicular pockets. Exert pressure from above downward and inward, making firm but interrupted pressure with the pad of the index finger. The amount of pressure depends upon the conditions found. The massage of the vesicles at times is a very difficult matter as they sometimes extend beyond the reach of the finger. At other times their contained secretion cannot be expressed on account of the unstable anatomical arrangement, or the secretion flows back into the bladder and can only be obtained by passing the wash water. Or there may exist a stenosis of the ejaculatory ducts. Of great assistance at times is pressure of the knuckles or fingers in the perineum on either side of the deep urethra.

Any secretions appearing at the meatus is immediately transferred to the culture media, slides are made, the wash water is passed in sterile centrifuge tubes and centrifugalized, and smears made of the sediment. (In our opinion cultures made from the sediment is a waste of valuable time and material.) The slides are fixed in equal parts of ether and alcohol, or a saturated solution of corrosive sublimate; they are treated with one of the various contrast stains and the Gram decolorization stain is always used for diagnosis. The addition of one drop of acetic acid is helpful in detecting pus corpuscles.

In our series of 170 cases, representing over five hundred separate examinations (as each case was examined at least three times; others many more times), 32 were positive, or 18.2 per cent. Of these 14 showed gonococci by culture, 8 by slide and culture and 10 by slide alone. Of the 14 cases by culture, 10 showed contaminating bacteria, *i. e.*, only 4 showed a pure culture of the gonococcus.

The bacteria found are often of the non-pathogenic variety, but that germs other than the gonococcus are responsible for the persistence of prostatitis and chronic seminal vesiculitis there is no doubt in our minds. Gonorrheal in origin, the non-pathogenic germs constantly found in the urethræ find a most favorable habitat in those organs damaged by the gonococcus and help to keep up the chronic inflammation. We found a long and short bacillus, colon, diplococcus (small) and often a large biscuit-shaped diplococcus larger than the gonococcus, but it did not decolorize; also streptococcus, staphylococcus, pneumococcus and some bacteria which could not be identified.

In the so-called catarrhal discharge, where gonococci are proved to be absent but large numbers of bacteria described as non-pathogenic are found, we believe these bacteria take on a decided pathogenic attitude and become pus producers.

In a study of the normal contents of the seminal vesicles, in which a bacterial examination was made directly from the vesicles within a few hours after death, one showed a large bacillus, three showed no growth, but one of these contained considerable pus.

In determining what constitutes a cure it is not only necessary that the gonococci be proved absent, but also that no pathological condition is left behind. The presence of pus in the vesicular strippings indicates a chronic inflammation which may or may not be due to the gonococcus. As already pointed out, other bacteria than the gonococcus are capable of propagating this condition. Pus in the seminal vesicles and prostatic fluid means a pathological secretion possibly leading to sterility, sexual neurasthenia, loss of sexual power, and probably enlarged prostate. Pus is always suspicious.

This series of cases has taught us that only by persistent and repeated examinations, by injections of silver nitrate, the use of the Kollmann dilator, sounds, alcohol, massage and culture, can we assure the patient that he is well.

Besides these tests we have one of great promise in the complement-fixation test applied to the study of the serum of a patient having gonorrhea. In the article by Schwarts and McNeil in the *American Journal of Medical Sciences* for May, 1911, they prove that a positive reaction is an indication of living gonococci somewhere in the body. They point out that it is of the greatest assistance in making a correct diagnosis in gonorrheal rheumatism and other forms of arthritis or rheumatism.

Gonorrhea is a curable disease; it may take months, rarely years; the difficulty comes in saying when it is cured.

NITROUS OXIDE ANESTHESIA IN ADENOID AND TONSIL OPERATIONS.

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I shall not dwell upon the discovery of nitrous oxide by Priestley in 1772, or its physical or chemical properties for I take it that all are familiar with them.

Nitrous oxide as a general anesthetic is becoming more popular every day with the general surgeon. The one real drawback to its general adoption up to the present time has been the fact that for long operations it requires an expert to administer it, because it takes a varying amount of oxygen for different patients.

In tonsil and adenoid work this factor has fallen away, for the anesthesia demanded is so short that oxygen is unnecessary.

That nitrous-oxide anesthesia is more devoid of danger than any other known form of anesthesia is generally conceded.

Hewitt¹ was able to collect only seventeen authentic deaths over a period of forty years, and when one considers that countless numbers of administrations are never recorded, the death-rate may be said to be infinitesimal.

It has been shown by Van Arsdale² that when nitrous oxide is inhaled it is absorbed and carried in the blood-plasma to the brain where it exerts its anesthetic properties through its own inherent action upon the brain.

Hamburger and Ewing³ have shown that nitrous oxide has no bad effects upon the blood itself. It does not increase hemolysis as does ether. What slight changes do occur during the administration are transitory and within two hours after the anesthetic, examination has shown the blood to be the same as before the operation.

When nitrous oxide is inhaled it sometimes causes mental excitation—which can only last a few seconds, however,—for anesthesia is produced within thirty seconds. The respiration becomes deep, tends to be somewhat more rapid than normal, slightly irregular and is often of a stertorous character. Nitrous oxide stimulates the vasomotor centre, causing a rise in blood-pressure, but has no direct definite action upon the heart. The pulse becomes somewhat more rapid at first, but slows as the anesthetic is continued. The conjunctival and corneal reflexes are lost, the pupils dilate and the eyeballs turn inward or upward and become fixed.

These are the signs of true nitrous oxide anesthesia. In children this

occurs in about twenty seconds. If the pure nitrous oxide is continued beyond this stage, which is unnecessary, the patient becomes cyanosed and jactitation and clonic movements of the extremities set in. These symptoms are the result of the asphyxial element in the administration of this anesthetic.

The cyanosis which takes place cannot be taken as an index of the cardiac or respiratory depression, as it is due to a capillary stasis and insufficient oxygenation of the blood. It clears up under oxygen. A stasis allowed to persist too long will of course tax the right heart beyond the normal. The stasis also causes a swelling of the brain which results in headache. The cyanosis is not due to any condition of the nervous system or heart, and for that reason is not much more dangerous than that caused by a severe coughing spell or an asthmatic attack.

At the Children's Hospital we have the patients rebreathe the gas—that is—have them exhale into the gas bag with the outlet valve of the mask closed. There are several distinct advantages of rebreathing the gas:—

It requires less gas for each narcosis.

It materially shortens the time it takes to produce anesthesia.

Besides these, rebreathing warms the gas in the reservoir which is of distinct disadvantage in so far as warm gas is less irritating to the lungs, so that there is less liability to post-operative bronchitis or pneumonia.

Gatch⁴ also says that warm gas has been found to induce anesthesia faster and give more perfect relaxation.

By rebreathing into the bag a certain amount of carbon-dioxide is given off with each expiration, and this is again breathed during the next inspiratory phase, thus increasing the CO₂ content of the blood; and this, if the theory of Henderson be true, is of very great value.

Yandell Henderson,⁵ assistant professor of physiology at the Yale Medical School, seems to have proved that shock does not result from over-stimulation of the vagi or from the loss of arterial tension, as has been supposed all along, but from inhibition of metabolism as a result of the pain and the increased respiration which always accompanies pain. Diminished metabolism causes a diminished amount of CO₂ in the blood which Henderson calls acapnia.

Carbon-dioxide, Henderson believes, is the normal stimulant of the venous wall, besides being a respiratory, vasomotor, and cardio-inhibitory stimulant. A reduction of the CO₂ content of the blood causes, as a rule, shallow, feeble respiration, a rapid pulse, and low blood-pressure, while excess of CO₂ causes deepened respiration, slowing of the pulse and increased blood-pressure. Lack of carbon-dioxide in the blood then causes lack of venous tone, and decreased venous tension decreases the amount of blood that reaches the heart. If loss of tone is too great the heart does not fill and ceases beating.

It may be interesting to mention that Henderson in the *American Journal of Physiology* makes the statement that ether hyperpnea is as liable to produce fatal apnea vera as pain hyperpnea; this means that ether given in such a manner as to occasion rapid breathing is as likely to induce shock as intense pain. Crile⁶ has shown also in the physiological laboratory that animals under N₂O withstand shock-producing trauma much better than under ether.

If these statements are found to hold in practice and knowing as we do that under N₂O the heart continues to beat after the respiration has ceased from muscular spasm, a result of asphyxia, we must admit that it is not only the safest anesthetic, but also the best anesthetic from a physiological standpoint.

Its other advantages are absence of uncomfortable sensations to the patient, almost immediate recovery from the anesthetic, the absence of lung complications, of danger to the kidneys, liver and heart. Post-anesthetic vomiting is absent and therefore the complications caused by it are absent.

The after effects are slight—sometimes there is dizziness and headache; these have disappeared, however, since we do not carry the anesthesia into the stage of asphyxia.

In children the anesthetic and symptoms must be watched closely, for children go under very rapidly; in fact, they are often under before they stop crying.

All authors agree that the administration of N₂O is contraindicated in the case of obese plethoric individuals or those having atheromatous arteries, and while some have warned against N₂O in infancy, I have seen no ill effects from it even in very young infants.

The only other contraindication to my mind is in those cases where the status lymphaticus is suspected. I say suspected advisedly, for it is a condition which rarely can be more than surmised during life. But as the condition is most frequent in infancy, often existing without having caused definite symptoms, but nevertheless having caused a hypertrophy of the pharyngeal ring of lymphatic tissue as a part of its pathological course, and in view of the fact that Holt says that "these cases are very imperfectly understood, and are not rare," I can easily imagine cases having undergone operation with no apparent harm. Knowing as we do, that an anesthetic, particularly chloroform, has produced death in this condition, I take it that we have one more good reason for using nitrous oxide, which causes less shock and no constant blood changes, as the anesthetic for routine work.

I have had only one case, this in an adult in a large series where N₂O was unsuccessful; and have seen one other. Ether was then resorted to with success in both cases.

Though the most highly organized centres are easily and speedily af-

fect, relaxation is tardy; this is of little consequence, however, in tonsil and adenoid work, for the rigidity of the masseter muscle is overcome by adjusting the mouth gag before the nitrous oxide is started.

The elimination of nitrous oxide takes place principally through the lungs, and so oxygen may be said to be a specific in asphyxia resulting therefrom.

Strychnine and atropine are said to be therapeutic antidotes. If, however, the contentions of Henderson be true, they are contraindicated. A saturated solution of camphor in olive oil, which is a cerebral stimulant when injected, would seem more valuable in shock resulting from an anesthetic.

Besides the pleasantness and safety of nitrous-oxide anesthesia, a very desirable feature of its narcosis is the fact that the cough reflex is maintained. Irritation, therefore, of the glosso-pharyngeal under this anesthetic, besides inhibiting respiratory movements for a short period of time, allows of gagging. This I have become accustomed to and even prefer, as it helps in keeping the blood from the larynx and gives me the strongly contracted internal pterygoid muscle to manipulate my tonsil upon.

I have discussed the admission of nitrous oxide without oxygen; that is the short anesthesia. It has been this shortness up to quite recently that prevented general adoption of nitrous oxide in enucleating the tonsils; but now thanks to the perfection and publication by Dr. Greenfield Sluder, of St. Louis, of his method of tonsillectomy by means of his guillotine, time does not enter into consideration any more.

I have found that the anesthesia produced by the nitrous oxide is of sufficient duration, not only to perform a complete tonsillectomy, but to remove the adenoids as well under a single administration. Ordinarily it takes on an average of thirty seconds to anesthetize a child and forty-five seconds for an adult. It should be remembered that the patient is not carried into the stage of cyanosis.

It is possible by means of the Sluder method to enucleate both tonsils and remove the adenoids in less than thirty seconds.

It has been advanced that one of the objections to the infliction of three rapidly successive wounds is that over-stimulation of the peripheral ends of the vagi may reflexly cause sudden stoppage of the heart, or produce a dangerous amount of shock. The question which then suggests itself is, Should there be a limit to our speed, and would it be better to divide the operation and give two administrations of nitrous oxide?

I myself think there is very little shock produced by tonsil and adenoid operations, nor do I think that the reflex stoppage of the heart need be seriously considered; for never have I heard of a case or seen one reported where such a result prevailed, no matter how long or severe the operation.

I have questioned my patients as to the pain during and after operation, and from their actions and answers conclude that there is a marked period

of analgesia following nitrous oxide; just how long this analgesia lasts I am as yet not prepared to say.

As to the bleeding following tonsillectomy under nitrous oxide I will say that there often seems to be a slight increase in the time required for coagulation. The changes are, however, not constant, and I think they are easily overcome by the administration of calcium lactate over a period of a week prior to the operation.

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MEDICAL AND SURGICAL PROGRESS.

HUMAN AND RAT LEPROSY.

A REVIEW OF RECENT LITERATURE.

By M. F. ENGMAN, M. D., of the Editorial Staff.

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Through the constant, untiring efforts of science, the mediaeval sphinx, leprosy, is beginning to divulge some of its secrets. It has come down to us through the ages that leprosy is contagious, therefore isolation-houses have existed as far back as A. D. 506. At the end of the thirteenth century there were about 2,000 leprosy asylums in France alone, and at least 200 in Great Britain and Ireland, which was undoubtedly a very potent factor in retarding the spread of the disease. The knowledge of the infectiousness of leprosy was largely confirmed by the discovery of the leprosy bacillus by Hansen in 1871. Since that time, during the modern progress of bacteriological technique, numerous investigators have tried to grow the leprosy bacillus, but their efforts have been in vain, and experiments upon the lower animals seemed to have produced only discouraging results.

In 1902 G. Van Houtum claimed to have grown the leprosy bacillus in a medium consisting of one-third beef broth and two-thirds fish broth, but the writer does not believe his researches have been confirmed. It was not until 1910 that any cultural results proved successful, when Moses T. Clegg, working in the Bureau of Science at Manila, grew an acid-fast bacillus symbiotically with amœbæ from the leprous nodules and spleen of leprous patients. By complicated bacteriological technique he finally succeeded in growing this acid-fast bacillus in pure culture.

Shortly after this, Duval, of Tulane University, New Orleans, succeeded in growing an acid-fast bacillus from leprous nodules and ulcers on a medium prepared as follows: The rind was carefully removed from the fruit portion of fully matured green bananas, all precautions to avoid contamination being used, and large blocks of the fruit were introduced in a slanting manner into sterile glass cylinders, at the bottom of which were cotton plugs wet with sterile distilled water. The plugs served to furnish moisture, and prevented the medium from drying. Sterile 1 per cent. solutions of tryptophan, cystein, and leucin were next prepared and a portion of each poured on and allowed to saturate the banana. These solutions were used separately and in varying combinations to determine in which the bacilli would grow best. The cultures were incubated at 30° C., and grew rapidly. In the transplants the bacilli developed in the form of small, glistening, white colonies in from four to six weeks. Growth on the protein-cystein medium showed very conclusively that the leprosy bacillus utilizes the end-products of digestion, and not the products of cell metabolism. Multiplication *in vitro* of an acid-fast organism was obtained from the transplanted leprous tissue on the above-mentioned medium from four cases of leprosy, which corresponded in every essential to the leprosy bacillus. These bacilli continued to grow in stab cultures, and it has been proved beyond a doubt, by animal experimentation and cultural features, that the organism cultivated by Duval is the leprosy bacillus of Hansen. At about the same time Dr. F. W. Twort, working in England, grew the same bacillus artificially.

The writer had the pleasure of listening to a paper by Drs. Duval and Gurd, at the New York Academy of Medicine, on December 29th, 1910, when Dr. Duval stated that he believed that he had cultivated the leprosy bacillus in pure culture after a great deal of difficulty; that it was necessary to place large quantities of the infected tissue on the culture medium to insure growth; that from pure cultures of this acid-fast bacillus he had caused experimental lesions in mice and monkeys. He further explained that the leprosy-bacillus cultures remained alive and virulent for months under unfavorable conditions, which seemed to him to explain much in the

transmission of the disease where houses in which lepers have lived have seemed to convey leprosy after a great length of time. Duval and Gurd furthermore stated that direct inoculation of the leprosy bacilli is possible, but they believe that it is not the usual method of transmission, their investigation pointing largely to the nasopharynx as the most vulnerable and frequent point of entrance.

Through the work of Maj. E. R. Rost and Capt. T. S. B. Williams, of England, there seems to be a difference in the morphology of the leprosy bacillus. Their researches seem to disclose four different types of organism, which they believe are four phases of a pleomorphic streptothrix. Capt. Williams believes that the bacillary form is really the result of very rapid division of the streptothrix under favorable cultural conditions, and that these forms are convertible by suitable methods of subculture into the acid-fast organism in which a streptothrix form and a bacillary form can be observed. It seems that the acid-fast streptothrix form can be converted into the acid-fast bacillus by change of cultural environment. Capt. Williams, therefore, claims that the four phases—namely, the acid-fast and non acid-fast bacillary type, and the acid-fast and non acid-fast streptothrix type, may be regarded as four different phases of the same organism. The animal experiments of these gentlemen afford belief that the injection of the acid-fast bacillus can cause leprosy-like nodules in guinea-pigs.

The results of these various investigators are rapidly disclosing the habits and characteristics of the leprosy bacillus, and no doubt animal experimentation will soon disclose much valuable information. Duval's experiments with monkeys have been productive in showing a certain type of leprosy in those animals. The waltzing mouse of Japan seems also susceptible to this acid-fast bacillus. This brings up the very interesting subject of rat leprosy.

Stefansky made the first recorded observation on this affection in 1903. Rats are afflicted with a communicable disease which closely resembles the lesions of human leprosy. These lesions present, upon microscopical examination, a bacillus very similar in all its tinctorial qualities to the bacillus of Hansen. Furthermore, the histological architecture of the nodules from these animals is very similar to those procured from human leprosy.

Quickly following Stefansky, many other observers reported rat leprosy—namely, Rabinovitch, Dean, Bull, Query, Currie, Brinckerhoff, and others. The disease seems to occur in rats almost all over the world—in the Orient, in Europe, and in this country. However, during the examination of 16,000 rats in Honolulu, which is an endemic focus of human leprosy, during an anti-plague campaign, no case of rat leprosy was encountered. In various communities leprosy rats have been found in from 0.1 to 0.2 per cent., which is the highest. The rats when suffering from the disease present cutaneous and subcutaneous nodules containing large numbers of this acid-fast bacillus. The disease is easily conveyed from one rat to another in the laboratory.

Brinckerhoff in his study of the disease, summarizes his remarks as follows: "In the leprosy-like disease of rats we have an affection which closely resembles, both in its etiological activity and in its pathology, the disease leprosy in man. The fact that the disease is readily propagated in the laboratory animal permits of its investigation in any laboratory."

Currie, working along the same lines in Honolulu, finds that the digestive tracts of certain mites normally inhabiting the skin and hair of rats contain the bacillus of rat leprosy in considerable numbers, and

therefore that these parasites may be one of the means of transmitting the disease.

One can readily recognize the vast importance of a thorough study of rat leprosy. If rats suffer from a form of leprosy, or if rats maintain in their bodies the leprosy bacilli, and if leprosy is due to a bacillus, the importance of rat leprosy in communicating the disease to man is obvious.

This work is all too new for investigators to have reached any conclusion, but the facility with which rat leprosy can be studied will no doubt largely assist in clearing up the connection at present existing between these acid-fast bacilli.

The present era of science seems to be vastly practical, as it is largely focused upon the study of insect-bearing diseases. It has long been thought, especially by the Japanese, that leprosy was an insect-borne disease, and that the leprosy bacillus, before it could be communicated, must undergo some change in an animal host of the lower order. Especially has this idea been brought forward by Hutchinson in his fish theory, and by Ashmead who has asserted that leprosy may be conveyed by flies or vermin.

Brinckerhoff has done some very interesting work in this line. He allowed mosquitoes to bite lepers, and concludes that the mechanism for the transference of leprosy by the mosquito from a leper to a healthy person's skin does exist, as the fecal matter of the mosquito may contain leprosy bacilli, and as it bites the individual the animal defecates upon the skin.

Currie, working with flies and mosquitoes among lepers (and his experiments are exceedingly interesting and carefully performed), concludes as follows: (1) That flies when given an opportunity to feed upon leprosy fluids will contain the bacilli in their intestinal tracts and feces for several days after such feeding; (2) that the above fact, together with the well-known habits of these flies, makes it certain that given an exposed leprosy ulcer, these insects will frequently convey immense numbers of leprosy bacilli, directly or indirectly, to the skins, nasal mucosa, and digestive tracts of healthy persons; and (3) that our present state of knowledge does not permit us to determine whether such insect-borne bacilli are or are not capable of infecting persons whose skin and mucosa are thus contaminated, and that until we have more accurate knowledge on this point, we are justified in regarding these insects with grave suspicion as being one of the means of disseminating leprosy infection.

Currie finds, however, that mosquitoes which are fed on ulcers of leprosy patients do not contain the leprosy bacilli, the reason being that when these insects feed, they insert their probosces directly into the blood-vessel, and thus obtain the bacilli-free blood unmixed with lymph, and that this habit alone accounts for the absence of bacilli in their digestive tracts.

Sandes, working with insects in relation to leprosy, says that flies, fleas, mosquitoes and other insects are possible modes for the spread of the disease, but that such infection, if it ever does take place, is exceedingly exceptional. He believes that the bed-bug constitutes a very important agent in the spread of leprosy in leprosy communities, as he finds acid-fast bacilli in the intestinal secretions sixteen days after feeding on leprosy material. Long, in a brief report on the citation of a suggestive case, seems to be of the same mind.

We might say here in passing, that Hollman believes that heredity is not an important factor in the extension of leprosy, but that it is purely a question of environment and contamination or infection, and that the

danger of contracting leprosy to children born of leprosy parents increases with the length of exposure.

There seems to be very little progress made in the treatment of leprosy up to now, but the fact that the organism has been grown and that experiments in lower animals are possible must soon produce some newer and more beneficial method of treatment. The *x*-ray, arsenic, and chaulmugra oil are still being used. Of course, since the cultivation of the organism upon artificial media, vaccines will occupy a prominent place in the therapeutics of the disease. Rost and Williams, working in India, have reported rather extensively upon this method of treatment, and, according to Rost, with rather surprising results. He treated twelve patients, five of whom are practically cured as far as clinical observation goes. Vaccines were given daily, which was followed by a rise of temperature to 100 to 105°F. He used one c.c. of a 1/400 dilution of dried culture and one c.c. of a sterilized six weeks' broth culture. After injections he found the local reaction in the nodules very marked, and he believes the best procedure in the nodular cases is to obtain only slight reaction, while a more marked reaction is advisable in the anesthetic type. However, the treatment is too new for dogmatic statements.

Wise has recently reported on the treatment of leprosy by nastin. He has used the remedy from December 1908 to 1910, with rather encouraging results. Deycke believes that nastin is capable of producing reactions of a general local kind in leprosy tissue.

Antileprol, a derivative of chaulmugra oil, is another remedy brought forward by Engel. He speaks very flatteringly of it. It can be given in very large doses for a great length of time without disturbing the stomach, which makes it superior to chaulmugra oil itself.

Salvarsan has been tried in leprosy by Verteuil and others without very much change in the outward manifestations of the disease.

TREATMENT OF BLADDER TUMORS.

A REVIEW OF RECENT LITERATURE.

By JOHN R. CAULK, M. D., of the Editorial Staff.

1. Beer: Concerning the Treatment of Tumors of the Urinary Bladder with the Oudin High-Frequency Current. (*Annals of Surgery*, August, 1911.)
2. Buerger and Wolbarst: Fulguration Treatment of Papillomata of the Bladder. (*New York Medical Journal*, October, 1910.)
3. Binney: Present Status of Intravesical Operations for Tumors of the Bladder. (*American Journal of Urology*, August, 1911.)
4. Doré and Mock: Contribution to the Study of Endovesical Operations in Tumors of the Bladder. (*Annales des Maladies des Organes Genito-urinaires*, June and July, 1911.)
5. Keyes: Cauterization of Bladder Lesions. (*Interstate Medical Journal*, October, 1911.)
6. Marion: Endovesical Extirpation of Tumors of the Bladder by the Natural Channels. (*Presse Médicale*, December, 1910.)
7. Scudder: The Transperitoneal and Suprapubic Approach of Tumors of the Bladder. (*American Journal of Urology*, August, 1911.)

Great difference of opinion exists concerning the treatment of bladder tumors. During the past few months, many articles have appeared both in American and foreign literature on this extremely important subject. The problem of dealing with bladder tumors is a very serious one and the choice of procedure should depend upon the character and the location of the tumor.

The most frequent tumor of the bladder is the papilloma, and even the most benign appearing of these are extremely treacherous. We have all seen these small seemingly benign tumors, completely removed, followed rapidly by recurrences and transplantations. This fact has led most surgeons to consider the most benign bladder papilloma as potentially malignant. It is impossible to tell pathologically, whether or not a given papilloma is malignant or benign, without a careful microscopic study of the whole tumor and a portion of the vesical wall; even then, one is liable to be mistaken, as cases are reported in which detailed microscopic studies have been made and the tumor pronounced benign. Later, metastases to bones, etc., have proved to be carcinoma, so the question of malignancy must always be paramount; as Scudder says, "practically all bladder tumors cause death of the patient sooner or later." If the operative deaths and recurrences of bladder papilloma are combined under the head of operative failures (Watson), these have occurred in 29 per cent. of the so-called benign, and 46 per cent. of cases of cancer.

In view of the fact that so many of these cases recurred following suprapubic excision, attention was directed to the endovesical removal, with

the hopes of avoiding these disasters; and during the past few years, this method has acquired a host of supporters. On the other hand, there are many surgeons who believe the endovesical procedure unsurgical, consider the suprapubic incomplete, and advocate the transperitoneal operation. Finally, others adhere to Watson's method of cystectomy with ureteral transplantation or bilateral nephrostomy.

Thus, the various operative procedures are as follows: (1) Suprapubic cystotomy with removal of the tumor and part of the vesical mucous membrane, either with knife or cautery; (2) suprapubic cystotomy with partial resection of bladder wall; (3) suprapubic drainage for inoperable tumors; (4) transperitoneal removal; (5) endovesical; (6) complete cystectomy.

Owing to the frequent recurrences and numerous transplantations not only in the bladder but occasionally in the line of suprapubic incision, suprapubic cystotomy is being more and more discarded. The statistics of Albarran of forty-eight benign tumors operated on by this method, show 12 per cent. recurrences, and $6\frac{2}{10}$ per cent. mortality. Clado's statistics, $15\frac{1}{2}$ per cent. recurrences and $6\frac{4}{10}$ per cent. mortality. Motz, giving the results of the operations of Guyon and Albarran from 1882 to 1899, shows seventeen operations, eight cures, five recurrences, and four deaths. The statistics of Watson and Cunningham of two hundred and seven papillomas operated on by this method without bladder resection show mortality of 10 per cent., and 20 per cent. recurrences in three years in one hundred and forty-one patients reviewed; 9 per cent. recurrences more than three years after.

The removal of a bladder tumor through the suprapubic incision is at times quite easy. But if the tumor is far down toward the base of the bladder, as is the usual location, the exposure is often insufficient. Suprapubic excision of the tumor with partial resection of the bladder-wall, after having stripped back the peritoneum, is in many cases not a difficult procedure. Of course, the farther down toward the base of the bladder the tumor is located, the more difficult the stripping back of the peritoneum, and the more difficult the operation. Recently the transperitoneal operation has been brought forward by Mayo. This method was first suggested by Rydygier, in 1888. Harrington also advocated this method in 1893; but Mayo has in recent years put it on a more substantial foundation, and it is now gradually gaining many advocates. By it, one is enabled to inspect various abdominal viscera and glands for metastasis, and is then in a position to determine whether or not a radical operation is advisable. This operation, being of recent date, it has not an established percentage of cures, recurrences, and mortalities; but the results have been satisfactory and the operation has been done with ease and safety.

Tuffier, Deguervain, Barney and others demonstrated that normal sterile urine is not very irritating to the peritoneum and that with careful manipulation during the operation, the chance of infection is small. Tennant, of Colorado, has demonstrated recently that a transperitoneal cystotomy can be done with safety even in the presence of a severe cystitis. Scudder thinks that no matter how benign bladder tumors appear, a radical excision of the whole thickness of the bladder-wall is indicated in the most benign-appearing cases of bladder papilloma. This operation is an excellent one and will, no doubt, be more frequently used.

The complete cystectomy of Watson with bilateral nephrostomy is an operation which is not done frequently; it should be done only when a

partial resection is inapplicable. Scudder remarks that the transperitoneal operation will care for many of the cases previously operated on by this method.

The method of treating bladder tumors, which is most frequently employed to-day in the hands of expert cystoscopists, is the endovesical. Of the endovesical procedures, there are several and they will be described below in more or less detail. Civiale first attacked a papilloma of the bladder through the urethra with a trilabe. In 1881, Carter, through a dilated urethra, seized a papilloma. Spencer Wells, in 1883, published three observations in women of removal of a papilloma after dilating the urethra. In 1885, Gruenfeld removed a bladder tumor through a non-dilated urethra. With Nitze, the endovesical operation found its true beginning. He described his first instrument in 1891, and, largely through his genius, the method has been perfected. Doré and Mock, in their article, take up the whole subject of the development of operative cystoscopy, giving a description of the various cystoscopes with the advantages of each. Their description is very thorough, and the readers are referred to their article if they are particularly interested in the subject. Among those, who have developed this branch of surgery, are Nitze, Coleman, Albarran, Boëhme, Lohnstein, Klose, Casper, Young, Beer, Marion, Keyes, and others.

The operative cystoscopes may be divided into the direct and indirect; and the indirect into those with the operative piece fixed, and those with the operative piece movable. The direct method has been advocated chiefly by Luys, of Paris, and Keerschmaecker, of Antwerp. Luys' instrument resembles an endoscope. His claim is that with proper care, there is less chance of obscuring the field with blood and that a better view of the tumor is obtained and cauterization more exactly performed. This type of instrument requires many sittings to complete an operation on anything but the smallest tumors. It may be applicable to some extent in the female, but it has a very narrow range of usefulness in the male. The indirect method is the one most frequently employed by one or the other of the various instruments or procedures. The most frequently used instrument is that of Nitze, and the tumor is either removed with a snare, cautery or lithotrite attachment. In America, Myer, of San Francisco, and Kolischer and Schmidt, of Chicago, are the only surgeons who published personal experiences prior to 1908. Since then, reports have come from Young, Keyes, Buerger, Beer and others. Among the various endovesical procedures may be mentioned removal with the snare, cauterization, injection of the base of the tumor, as Casper has done, removal with a rongeur cystoscope, resorcin injections after partial removal, and treatment with high-frequency current, the latter being the most recent.

Employment of the cautery and removal of the tumor with various operative cystoscopes are more or less familiar and an old story; but the method of treatment with high-frequency current, which was proposed by Beer in 1910, seems worthy of special mention, as his reported results are so satisfactory. He has treated successfully 5 cases of primary papillary tumors of the bladder, aggregating nine distinct tumors. He has also gathered reports from other operators, with a total of thirty-eight papillary growths treated in this manner; and as he says, "it must be evident to the most skeptical, that in this new method we have raised a mighty rival to the old suprapubic and to the other transurethral, operative cystoscopic methods." Among the contributors to these 38 cases are Drs. Keyes, Buerger, Wolbarst, McCarthy, Esberg, and Ware. In the October num-

ber of the JOURNAL, Dr. Keyes has reported his results which are entirely in harmony with those of Dr. Beer. The essential instruments for this line of therapy are a high-frequency current with the Oudin resonator, a catheterizing cystoscope and a heavy insulated copper wire. This method of treating papillary growths with the Oudin current has been in use for fifteen years for the removal of surface growths, but its application to tumors of the bladder was made by Dr. Beer in 1910.

The application consists in the passage of the current through the insulated copper electrode among the villæ of the tumor, and it is allowed to play from fifteen to thirty seconds at each application. The nearer the electrode approaches the base of the tumor, the shorter the application, and repeated applications are made at different spots of the growth until the whole growth is destroyed, disintegrated, and voided in small pieces. The longest total applications that Beer has used at one sitting, aggregated ten minutes and thirty seconds at twenty different spots. He says a total of three to five minutes will usually suffice. This procedure is repeated at intervals until the growth is destroyed. His results by this method have been very striking and as he says, "must convince the skeptical." In general, it may be stated that the endovesical method should be used for small tumors, particularly papilloma, and for recurrent tumors, although the method is applicable in several sittings to tumors of large size. Marion says, "among the pediculated or sessile tumors, all those whose appearances are simultaneously seen in the field of the cystoscope placed in the central position in the bladder, and whose volume does not exceed that of a small walnut, should be removed by the natural route." The number of tumors is no contraindication to the method. In fact, it speaks for it. As Pasteau says, "the endovesical operation is particularly to be preferred in small and numerous tumors, because with the open bladder, they may be missed, being obscured beneath the folds of the mucous membrane." As said before, the method is particularly valuable in recurrences after a suprapubic or otherwise. Tumors can be followed cystoscopically and cauterized with the high-frequency current, as they appear. The method is also employed in some cases to control bleeding, and palliatively to prolong life. Nitze has employed it in infiltrative tumors, both as palliative and radical. The advantages of the method are that the patient does not have to take an anesthetic, that the danger of implantation is less, that one is not as liable to overlook small tumors as with an open bladder, that the patient can be up and attend to his business, and does not run the danger of a fistula.

This method is not as a rule applicable in infiltrative tumors. Some advise against it in very large tumors or very vascular tumors, owing to the danger of hemorrhage. Hemorrhage, however, is not as a rule troublesome, particularly after high-frequency treatment or cauterization. It is seldom alarming, and as a rule can be controlled by lavage. It is unusual to have to employ suprapubic cystotomy on account of it. Weinrich says, that the size of the tumor does not contraindicate the use of this method if the bladder is not contracted, so as to interfere with manipulation.

Intense cystitis, contracted bladder, and tendency to hemorrhage by distension of the bladder, contraindicate the method. Among the opponents of these procedures have been Israel, Rovsing and von Frisch. The last two give as their reason the high percentage of malignancy and consider the operation unsafe on that account. Cathelin and Rafin have been opposed to it on account of technical difficulties; but after weighing

evidences for and against, it seems that this method is the one of choice in many cases of bladder tumors.

The mortality statistics following endovesical operation are as follows: Statistics of Nitze in 1905, presented by Weinrich, comprise 150 cases, with one death, as compared with 14 per cent. following the suprapubic method. Fifty per cent. of these cases showed no recurrence in three years. In Nitze's own cases twenty recurred or 11 per cent. of the whole number. Statistics of Strauss, twenty-two operations, four recurrences, 18 per cent. Those of Marion, 12 cases, eight of which have been followed, six cures, 75 per cent., one recurrence two years after. These cases comprise five papillomas, two epitheliomas, one infiltrative tumor, and three pediculated tumors.

Thus it seems that of the various operations dealing with bladder tumors, the two most important are the endovesical, particularly with high-frequency current, for benign tumors, and the transperitoneal for ones which cystoscopically and clinically seem to be malignant.

SOME RECENT LITERATURE ON SPINAL CORD TUMORS.

A REVIEW OF RECENT LITERATURE.

By SIDNEY I. SCHWAB, M. D., of the Editorial Staff.

1. Flateau: Tumors of the Spinal Cord and Vertebral Column. (*Nouvelle Iconographie de la Salpêtrière*, Nos. 1, 2, 3, and 4.)
2. Auerbach: A Noteworthy Case of Intramedullary Tumor of the Spinal Cord. (*Journ. fuer Psychol. und Neurol.*, Bd. 17.)
3. Veraguth and Brun: A Subpial Macroscopic Intramedullary Solitary Tuberculous Mass at the Segmentation of the Fourth and Fifth Cervical Vertebrae; Operation; Recovery. (*Correspondenz-Blatt fuer Schweizer Aerzte*, Nos. 33 and 34, 1910.)
4. Babinski and Jarkowski: The Possibility of Determining the Level of Lesion in the Spinal Cord by Certain Reflex Disturbances. (*Neurologja polska*, Vol. I, No. 1, 1910.)
5. Kleineberger: A Remarkable Case of an Accumulation of Fluid in Tumors of the Spinal Cord. (*Monatschr. fuer Neurol. und Psychiat.*, p. 346, October, 1910.)
6. Nonne: On the Occurrence of a Marked Phase-One Reaction in the Absence of Lymphocytosis, in Six Cases of Tumors of the Cord. (*Deutsche Zeitschr. fuer Nervenheilk.*, October, 1910.)
7. Frankel: Growths of the Vertebral Column as Shown in X-ray Pictures. (*Fortschr. a. d. Gebiete d. Röntgenstrahlen*, No. 16, p. 345, 1911.)
8. Potts: Intradural Cyst of the Spinal Meninges Removed by Operation; Recovery of the Patient. (*Journ. of Nerv. and Mental Dis.*, No. 10, 1910.)
9. Engels: Casuistic Contributions on the Segmental Diagnosis of the Cord. (*Deutsche. med. Wochenschr.*, No. 2, 1910.)
10. Hunt and Woolsey: Tumors of the Cord. (*Annals of Surgery*, September, 1910.)
11. Bailey: Anesthesia and the Lack of It in the Diagnosis of Spinal Cord Tumors. (*Journ. of Nerv. and Mental Dis.*, No. 4, 1910.)
12. Oppenheim: Contributions to the Pathology of the Cord. (*Zeitschr. fuer die gesamte Neurologie und Psychiatrie*, No. 2, July, 1911.)

There are a number of interesting questions presented by spinal cord tumors which are still in the process of solution. It may be of interest to review some of the literature, in order to see if we are any nearer a fairly complete understanding of the various problems presented by tumors of the cord. About twenty-five years ago Gowers made the diagnosis and advised operation in the first recorded case of spinal cord tumor, which was carried out by Victor Horsely in 1887. The original Gowers and Horsely case stands out to-day as one of the most important contributions to neurology and surgery. Ten years later Brun's monograph appeared, and in this 20 cases operated upon were described. The number of cases noted by neurologists and surgeons now rapidly in-

creased, and in 1908 there were at least 140 cases easily accessible to the medical reader. Since that time—that is, within two or three years—the number of cases has increased very much. The operative mortality is now about fifty per cent., and this mortality corresponds roughly to the percentage of improvement in cases of this kind. Still, in the presence of a suspected case of spinal cord tumor, the differential diagnosis and surgical treatment apparently offer almost as great a variety of problematical instances as they did in the early stages. It is for the purpose of determining whether these problems have become any simpler—or, rather, whether we are in possession of data making their solution less difficult than before, that the present review of recent literature is reported here.

A very comprehensive paper by Flateau (1) might well form the starting point of this inquiry. This paper was published in 1910 and is based upon material of 21 cases, personally observed and studied by the author. He divided this material into three divisions: The extra-, the intra-vertebral, and the vertebral. This division would be similar to the more commonly used American, or English classification; that is, the spinal, the extra- and the intra-spinal. The clinical description of this series of cases is well worthy of attention. In detail and general rounding-up of the clinical data the French are masterly. In a brief review, space is lacking for more than a glance at the conclusions of this brilliant paper. The one-stage operation is advised. The mortality percentage is about 50 per cent., and corresponds more or less with the percentage of cured and improved cases. This is about the same as is found in the Oppenheim series. Particular attention is called to the necessity of avoiding undue traumatism in operation. As to the number of vertebræ which can be removed, it is wrong to suppose that the column would lose to any great degree its static ability. Although it is possible to localize with great exactness the primary seat of the tumor, it is likewise necessary to remember that up and down the cord, starting from the level at which the tumor is located, there is usually found an edema which is capable of causing most important symptoms. This edema may become localized by inflammatory process of meninges, and even if the tumor is removed, the persistence of the former condition may be responsible for the permanency of cord injury and lack of surgical success. In regard to the incising of the dura mater. Flateau says it is of great importance to place the patient in the Trendelenburg position, with the head as low as possible. On the question of the restitution of function, following the successful removal of the tumor, the author can give no very positive information. He calls attention to the fact that complete restitution is possible even when the cord is apparently completely compressed. At the same time, it is found that no restitution takes place—or practically none—when the injury to the cord is scarcely evident. In speaking of the fatal results of operation, the author gives as causes faulty technique, septicemia, and a group of causes of which we know very little. Death apparently follows operation for no other reason than that the spinal cord or the brain cannot stand the operative traumatism. Before leaving this paper, attention should be called again to the complete report on the pathological data of the cases, to the careful clinical histories, and particularly to the complete bibliography, which brings the literature practically up to the date of the publication of this paper.

In the year 1910 there appeared fifty-eight papers devoted to the question of tumors of the spinal cord. As most of these papers were concerned, not alone with the clinical problem, but likewise with operative

procedure, it can be seen how much the interest of neurologists and surgeons has been aroused since the first publication. Of particular interest in the whole problem has been the differential diagnosis between the extra- and the intra-medullary growth; the importance of this distinction is obvious. It was formerly supposed and is generally pretty well believed at the present time that if a tumor of the cord could be definitely localized within the cord, operative procedure would be contraindicated. There are two contributions, in the literature gone over pertaining to this phase of the question, which are of interest.

Auerbach (2) reports a case in a woman thirty-three years old. The disease began with pain in the right upper shoulder region and likewise in the upper arm. Later there developed paresis of the right hand and atrophy of the interossei on the right hand to the elbow; the temperature and pain sensation declined. There were spastic gait, double-sided clonus, and Babinski. The pain is distributed on the right side to the neck. A laminectomy showed no tumor, but was followed by some decline of pain. The autopsy, however, showed an intra-medullary tumor located chiefly in the cervical enlargement. There is in this group of symptoms no particular reason why the tumor should have been localized within, rather than external to the cord. An operation was plainly indicated.

In a paper by Veraguth and Brun (3) is reported what is apparently the first case on record of a tumor within the spinal cord, in which a growth has been removed successfully, with disappearance of nearly all the spinal symptoms. The case was one of solitary tubercle under the pia mater and within the cord substance, at the level of the fourth and fifth cervical segments. At the outset of the illness, there were pain, with stiffness in the neck and an area of diminished sensation for touch, and pain over the left shoulder. The knee-jerks increased, both sides ankle clonus and Babinski. The left arm and leg became paralyzed, and afterwards the right arm and leg became impaired. The left arm became totally anesthetic, and on the right side sensation for pain, cold and warmth, became diminished. The left phrenic nerve became paralyzed. In the subdural space no tumor was found. The pia mater was divided and a small tumor was found imbedded in the substance of the spinal cord. It proved to be a solitary tubercle surrounded by a thick connective-tissue capsule. An examination made one hundred and thirty days after the operation showed almost a normal condition. If these 2 cases are compared, it can readily be seen that in the latter a tumor within the substance of the cord would seem the more probable diagnosis, on account of the dissociation of the sensory from the motor symptoms. In the other case, however, no such dissociation being present, the diagnosis would seem to be in doubt.

A rather novel point on the question of level diagnosis is to be found in a paper by Babinski and Jarkowski (4). They make use of the fact that when the spinal cord is completely sectioned, an increase of reflexes appears in the part of the body below the section, the sphere of the increased reflexes corresponding to the area of anesthesia; but when, instead, a simple section of the spinal cord is injured longitudinally, then the anesthesia and increase of reflexes extend to different levels: the first corresponds to the upper limit, and the second to the lower limit of the lesion. The authors describe 3 cases in which this principle was used, and they are inclined to think that these reflex movements might, perhaps, be produced in cases of transverse spasmodic paralyses without anesthesia.

Inasmuch as an examination of the spinal fluid is a common procedure in suspected cord tumor, the observations of Kleineberger (5) are of interest. In the 4 cases forming the material of his paper, the fluid obtained by lumbar puncture was of clear amber color containing a large amount of fibrillation and 3 per cent. albumin, and in addition showing lymphocytosis. In all these 4 cases operation showed an extra-medullary tumor. It is probable that the yellow coloration of the fluid was due to some blood derivation.

In this connection Nonne (6) makes note that in 6 cases of tumor of the spinal cord he found the phase-one reaction, the so-called Nonne-Apelt, without lymphocytosis. Of these 6 cases, 2 cases were operated on, 2 came to autopsy, and one case was diagnosed independently by himself and Oppenheim. In one of the cases an intra-medullary tumor was found. From the above experiences, he concludes that the combination of a strong phase-one reaction and an absent lymphocytosis cannot be used to differentiate between an extra- and an intra-medullary tumor.

The aid which an *x*-ray examination gives in cases of tumor of the cord has been much discussed. It seems to be the concensus of opinion, however, that it is almost impossible to obtain a satisfactory result, except when the spinal column itself is involved in the growth. Frankel (7) calls attention to the fact of the frequency with which the metastatic and the malignant growths elsewhere in the body are found in the vertebræ, particularly when the primary growth is located in the prostate, or breast. Such metastases, particularly in cases of prostatic carcinoma, are the first evidences of disease, and are frequently the cause of errors in diagnosis; therefore, in cases of elderly men with pain in the bones, or in the region of the sciatic nerve, and other neuralgias, an examination of the spinal column with an *x*-ray picture is very essential. The metastases are most frequent in the lower dorsal and the upper lumbar vertebræ. Primary tumors of the vertebræ are rarely met with. When they are found, they are, as a rule, malignant and of unfavorable prognosis, and the primary tumors of the vertebræ can be, as a rule, distinguished from the metastatic growths. In the metastatic, as a rule, the shadow does not extend from the vertebræ to the neighboring soft parts; in the primary malignant growths the shadow is limited to the original seat of location. In addition, the carcinoma and enchondroma can be distinguished by the *x*-ray. Included in this paper are twenty pictures showing the results of the author's studies.

In a paper by Potts (8) an interesting point in spinal localization is brought out. The case had reference to an intradural cyst of the spinal meninges, which was removed by operation. The most interesting fact of the case was an isolated testicular analgesia, which disappeared following the removal of the tumor. The author believes that probably the spinal centre for the sensation of the scrotum is the eleventh and twelfth dorsal and the first lumbar segments, and that the dorsal segment receives its impression from its connection with the sympathetic system.

In a paper by Engels (9) there is some discussion in his second case of stab-wound at the height of the second and third lumbar segments, which may have reference to more exact localization of tumor growths in this region. His observation seems to prove the fact that the centre for the peroneal group of muscles is located higher than the segments involved in the lesion.

Hunt and Woolsey (10) regard stiffness of the spinal column, with localized pain and tenderness, as characteristics of tumors of the column. They take up again the question of differential diagnosis between the

intra- and extra-medullary tumors. Extra-medullary tumors develop from the beginning, with progressive paraplegia, with pain of segmentally distributed character. In intra-medullary muscle, pain is a warning of its appearance and suggests more of a subacute or chronic myelitis. In this paper is found the description of 13 cases of spinal-cord tumors operated upon and reports concerning the progress of the cases after operation.

Bailey (11) calls attention to the importance of anesthesia, or some sensory disturbance, as a necessary part of the diagnostic features of the spinal-cord tumors. In tumors of the spinal cord, as a rule, there is no very definite upper limit of sensory disturbance, such as is found in myelitis and traumatic lesions. He believes that the dissociation of sensation is no differential diagnostic point of value in intra- and extra-medullary cases. For the localization of the tumor disturbances of tactile sensation is the most important, if the sensory difference can be of value. In cases of completely intact sensation, tumors of the spinal cord cannot be diagnosed with certainty and should not be operated upon. In spite of this very definite statement, however, the author quotes one case of caudal tumor in which there was no disturbance of sensation.

It can be seen from this array of papers that the difficulties presented by spinal-cord tumors are, or can be, placed under three different heads: (1) The diagnosis of the tumors themselves; (2) the localization of the tumor after it is diagnosed, and (3) whether it is an intra- or an extra-medullary growth. On the second point it can be seen what progress has been made within the last two years. The localization can now be made with a great deal of exactness; so much so, that practically in no case is it necessary to remove more than three vertebræ. In regard to the last question there seems at present no definite unanimity of opinion, and one is forced to admit that in the presence of a tumor, plainly diagnosed and carefully localized, the question of intra- or extra-medullary position must be left for the operation itself to disclose. The question of diagnosis is mainly dependent upon tumors located within the limits of the actual cord substance; that is, between the high cervical and low lumbar limits. The territory embraced in the cauda-equina, the conus and the epiconus is still a region full of diagnostic pitfalls. Not only is the localization in this region extremely difficult, but exploratory operations directed towards discovering the lesions here are accompanied by a degree of mortality; and for the present, at any rate, we must regard this region as one difficult of surgical approach with safety to the patient and difficult of diagnostic accuracy, both as an actual fact and of localization. In this connection a very instructive paper by Oppenheim (12) is very much to the point. In this paper 3 cases are quoted in great detail, in one of which, in spite of the most careful study and apparently accurate data for localization in the operations performed by Kruse, no tumor was found. Two operations were done, in each of which three vertebræ were removed, with no relief of symptoms. In the second case practically the same condition was found. There was a negative finding in the second case by the operation and by the autopsy. It was only when the cord was examined microscopically that the evidence of tumor formation was found. This paper of Oppenheim's is a very suggestive contribution, and suggests that in tumor-symptom-complexus in the cord there may be other processes unrelated entirely to tumor formation, which, on account of their localization, produce practically the same clinical feature. Another thing that this paper brings out is, that in an instance of fatal ending of spinal-cord operative case it is always necessary to examine the spinal cord microscopically before coming to the conclusion that the diagnosis was wrongly made.

X-RAY THERAPY IN GYNECOLOGY.

A REVIEW OF RECENT LITERATURE.

By E. H. SKINNER, M. D., of the Editorial Staff.

1. Albers-Schœnberg: Roentgen Therapy in Gynecology. (*Verhandlungen der Deutschen Roentgen-Gesellschaft*, Band V, p. 21; *ibid*, Band VI, p. 26; *Archives Roentgen Ray*, Vol. XIII, p. 196; *ibid*, Vol. XIII, p. 260.)
2. Bardachzi: Upon Roentgen Therapy in Gynecology. (*Muench. Med. Wochenschr.*, No. 42, p. 2184, 1910.)
3. Bordier: X-ray Treatment of Interstitial Uterine Fibroids—Artificial Premature Menopause. (*Archives Roentgen Ray*, Vol. XIV, p. 211.)
The Radio-Therapeutic Treatment of Fibroma of the Uterus: Its Efficiency, Indications and Results. (*Archives Roentgen Ray*, Vol. XVI, p. 92.)
4. Courmelles: Sterilization by Means of the X-rays. (*Archives Roentgen Ray*, Vol. XIII, p. 196.)
5. Dœderlein: The Roentgen Rays in Gynecology. (*Monatschr. fuer Geburtsh. und Gynækol.*, Band XXXIII, Heft 4 and 5.)
6. Fränkel: Favorable Influence upon Periodical Pains and Diseases of Women by the Roentgen Rays. (*Fortschr. an der Gebiete der Roentgenstrahlen*, Vol. XIV, p. 120.)
7. Griscom and Pfahler: Roentgen Therapy in Gynecology. (*New York Med. Journ.*, Vol. 91, p. 135.)
8. Goerl: Sterilization of the Female by the X-rays. (*Muench. med. Wochenschr.*, No. 34, p. 1788, 1910.)
9. Krœnig and Gauss: How Much will X-ray Treatment Influence Our Operative Treatment of Menorrhagia and Myomas. (*Muench. med. Wochenschr.*, No. 29, p. 1529, 1910.)

X-ray therapy is assuming a position of the greatest importance in gynecology, because the x -ray, when carefully applied, can do the patient no harm, whereas it may probably spare the patient a most severe operation. All the literature upon this subject is recent, and it has been difficult to choose a limited number of articles for review, as especially the German literature has been abundant both in the theory and practice of gynesis x -ray therapy.

Courmelles, Fränkel, Gauss, Goerl and Deutsch were among the first to call attention to the practical usefulness of the x -ray in promoting an artificial menopause and the application of this procedure in the treatment of uterine hemorrhage incident to the presence of fibroids and myomas of the uterine body. Albers-Schœnberg, as is his custom, applied himself to perfecting the technique of such irradiations and has endeavored to place the gynesis rôle of the x -ray upon a firm basis of fact.

Bordier has more recently outlined a technique which may be duplicated by an experienced radiologist with the employment of a radiometer of the Bordier or Holzkecht type.

Laboratory evidence in abundance has been published upon the atrophic action of the x -rays upon the ovary and testicle. In the human subject it has been shown that x -ray irradiation can produce infecundity without impotence. The rationale of gynecic irradiation depends upon this action, *i. e.*, ovarian atrophy and the artificial menopause incident thereto. The favorable change in the size and symptoms of uterine benign tumors at the critical period has frequently postponed operative procedures. Up to the advent of the x -ray there has been no means of advancing or producing the menopause except by surgical removal of genital organs.

In addition to the experimental knowledge of the vasoconstrictive action of the x -ray upon the ovaries, there are now abundant clinical reports of the uniformly favorable results obtained in the therapeutic application of the x -ray. Albers-Schönberg states that we may expect certain definite changes as follows: (1) The cessation of menstruation, producing a reduction in the myoma mass and the disappearance of the menstrual or intermenstrual bleeding accompanying myomas, together with relief from pain; (2) the relief of post-climacteric bleeding; (3) the lessening or cure of conditions in the post-climacteric period depending upon myomas without bleeding; (4) the alleviation of menstrual pain in the young without sterilization if possible.

The results of gynecic irradiation have been well outlined by Pfahler and correspond with the results as generally published. The artificial menopause is produced the more easily the nearer the patient is to the natural menopause. It is quite difficult to produce an artificial menopause in the young woman without long continued irradiation, and even then this cessation of menstruation may be only a temporary affair. In older women it is necessary to continue the irradiation long after the cessation of the hemorrhage to insure results. The reduction in the size of the tumor is always a delayed event and in some cases never occurs. Intramural growths seem to recede more rapidly than the subserous or pedunculated, and those tumors of long duration, which have undergone degeneration or calcification, are frequently unchanged.

The control of the hemorrhage attending myomas through irradiation is peculiar. Pfahler reports that it is frequently the first symptom to disappear, but this is at variance with the Continental radiologists. Albers-Schönberg, Goerl, and others report that the period following the first series of exposures is usually quite profuse; in fact, more than has been the wont, but that following this first profuse menstruation there is a gradual recession leading to a total absence of the menses. This first profuse menstruation following the inception of x -ray treatment has led several Continental radiologists to warn against the employment of radical and large x -ray dosage in the treatment of those women suffering with a profound anemia.

The relief of pain and bleeding in the post-climacteric period yields to x -ray therapy, if there is not an element of malignancy in the case. This fact should force the radiologist to be most sure of the diagnosis of the cases which he accepts for treatment, as results will depend upon the benign nature of the growths. Bordier has pointed out that degenerative fibromyomata, fibromata with hemorrhage, and cystic fibromata, do not justify radio-therapeutic treatment. Albers-Schönberg says that patients with less than 40 per cent. hemoglobin and great losses of blood with myomas must be excluded from x -ray therapy.

Döderlein, while expressing the opinion that, while gynecic x -ray therapy is still somewhat experimental, fine results may be expected, especially in climacteric hemorrhage where neither palpation nor microscopic examination can discover whether the hemorrhage is due to the degeneration of vessels in the uterus, disease of the ovaries, myometrium or endometrium. He feels that all other methods of treatment generally fail unless the apparently sound internal genitals are removed when the hemorrhages are weakening to such an extent that it is impossible to await the natural retrogression of the genitals with the approaching menopause.

Fränkel had his attention drawn to the use of the x -ray in gynecology in the course of the treatment of other conditions with the x -ray. He has given us much information regarding the production of a temporary menopause in younger women, especially where they were suffering with a dysmenorrhea. Without undue exposure he has obtained some surprising results without producing a permanent sterility or any interference with future fecundations. Reifferscheid also reported similar gratifying results in this class, but considered that there is danger in the young of malformation of the embryo in conception later. It may be that these fears of Reifferscheid were occasioned by his intimate acquaintance with the effect of prolonged exposures upon animals.

The most important feature of this work is the employment of a definite and constant technique for the exposures. It is not sufficient to put the abdomen of the patient suffering from fibroma before a focus tube and watch the fibroma disappear, the losses of blood vanish, and the menopause become established (Bordier). Nothing is to be gained unless we dose carefully both the quantity of x -ray energy introduced and the quality of the rays employed. Most of the literature reviewed here is rich in a delineation of results, but fails to convey an idea of the technique employed so that another could duplicate the dosage. However, Pfahler, Albers-Schöenberg and Bordier have been rather explicit and their respective methods will be fully described. This lack of description of an author's technique is not unusual, and it is pleasing to note that it is usually those of undoubted radiological ability who employ and describe an exact method in x -ray therapy.

It is generally conceded by all that the exposures should be given with the patient in the horizontal position and that the rays should be directed through the abdominal wall and not through the vagina. The compression diaphragm should be used and the rays focused upon both ovarian regions and upon the uterus. Pfahler makes a good suggestion on the focus point when he advises that the record of the area treated be obtained by placing a photographic plate beneath the patient. When developed this radiograph should show the lower part of the brim of the pelvis and the lower segment of the sacrum, similar to the shadows obtained in a bladder examination. It is also necessary to use filters to prevent dermatitis and filter out the soft rays as we only desire the hard penetrating ray to obtain results.

Bordier lays great stress upon the use of his chromo-radiometer tubes giving off penetrating rays registering Nos. 11 and 12 Benoist, and adequate filtration. He gives his exposures in series, each series consisting of nine irradiations, introduced by three routes—through the two lateral regions and the median line. Each of these surfaces receives three irradiations at intervals of two days each. The dose of the rays given at each séance is the maximum compatible with the integrity of the skin,

about 5 I (Bordier units) measured under the filter. By thus fractioning the dose he permits the introduction of a much larger dose, without the risk of dermatitis, than can be absorbed at a single séance. Bordier uses aluminum sheets for filtration. The first day he treats the two sides in succession, using a filter 1 millimetre in thickness. One of the Bordier pastilles is attached to the skin to be irradiated and the focus tube adjusted with its principal axis directed to the ovarian region, so that the divergent rays shall fall on the fibroma. The second day the patient rests. The third day, median radiation with a filter 2.5 millimetres thick, and with a dose of 1.5 I to 2 I, measured by the pastille. The fourth day the patient rests. The fifth day, the two sides are irradiated through a filter 1.5 millimetres thick. The sixth day, rest. The seventh day, median irradiation with a filter 3 millimetres thick. The eighth day, rest. The ninth day, irradiation of the two sides with a filter 2 millimetres thick. The tenth day, rest. The eleventh day, a final irradiation of the median area with a filter 3.8 millimetres thick. After this series of irradiations the patient rests for three weeks, and the time should be arranged so that the menstrual period occurs during this rest. A second series similar to the first is then given and the patient rests for three weeks when a third series is given. While Bordier finds that this is sometimes sufficient, he generally gives a fourth and fifth series. These intervals in the treatment permit of a much larger dosage, and the rest provides for a recession of a possible erythema.

Pfahler recommends that the target of the tube be placed 12 inches from the skin; that the tube register 6 or 7 Benoist; that the patient receive from 15 to 20 milliamperé minutes or its equivalent: that the patient receive a series of five or six treatments and then interrupt for two weeks. He uses slight compression with the cylinder and the protection of the skin with sole leather filters. In order to obtain a constant exposure with uniform hardness of the tube, he frequently requires three or four tubes for each séance, using each one for about two minutes. Pfahler says that in no series of exposures should more than 10 Kienbock units be given (an erythema dose).

Albers-Schoenberg method of focusing is the same as Pfahler's. He filters, however, through six layers of tin-foil interposed between four layers of kid leather, one millimetre thick. He recommends the use of a water-cooled tube which is arranged to provide a constant flow of cold water to the anticathode of the tube. The hardness of the tube should be 6 to 8 Walter with a current of 4 to 5 milliamperé. By this method he obtains the exact dose he requires in six minutes. While advocating no especial form of measurement for dosage to the skin beneath the filtre, he insists that at no series of exposures should more than the maximum erythema dose be given. He begins with six minute irradiations upon four successive days, all the above factors remaining constant, and waits fourteen days for a series of three irradiations. Then another wait of fourteen days and a repetition of three irradiations. Such series are repeated until the treatment shows itself effective, but during the whole course of the treatment the skin is carefully watched for the first sign of erythema, and if this occurs the treatment is suspended. In the treatment of cases of menorrhagia and dysmenorrhea, uncomplicated by myomas, he recommends the irradiation of the patient immediately following the period for four sittings of five minutes each with a similar series following the succeeding period. The duration of x-ray treatment should depend entirely upon the end we have in view. While a few

series of exposures may be sufficient to relieve a dysmenorrhea, it would require a large number of such exposures to obtain a complete suppression of the menses. So much for the technique.

With regard to the mechanism of the action of the x -rays in this treatment, there is some contention as to whether the atrophy of the tumors is a result of the precocious menopause or due to the direct action of the x -rays upon the cells of the fibroma. Bordier is inclined to the latter view as he has frequently found the tumor reduced in size before the cessation of the periods. Again, where there had been a cessation of the periods after two Bordier series and no diminution of the size of the growth, the exposures were resumed after four months' interval and the tumor gradually vanished. Then he also on two occasions treated patients in whom the menopause had occurred, but a very troublesome fibroma produced vesical and venous symptoms; the x -ray produced a reduction of the tumor and disappearance of the symptoms.

Reifferscheid has been able to examine the ovaries of six irradiated women and found "a degeneration of the epithelium of the follicles, an atresia of the Graffian follicles over the whole extent of the anterior aspect of the ovary, and little capillary hemorrhages in the cortical layer." The internal secretion of the ovaries does not seem to be modified. Women submitted to the radio-therapeutic treatment have not the so-called "flushes of heat" after the artificial menopause is established.

The voluminous case-reports attached to the articles of Albers-Schoenberg, Pfahler, Goerl and Bordier lend favorable criticism as to results, but the limits of this review are such as preclude their individual mention. To those who are anxious to delve more deeply into this subject, we would however refer them to the articles of Pfahler and Bordier in the English language and to the monograph of Reifferscheid, which includes a critical review of the Continental literature.

The possibility of sterilizing the female by x -ray methods is a cogent reason for interdicting the use of the x -rays by persons who have not a medical diploma (Bordier). One can readily imagine the use to which this agent could be applied if left in unscrupulous hands.

CORRESPONDENCE

PARIS LETTER.

HYPERTROPHY OF THE THYMUS AND ITS CLINICAL FEATURES.

By AUGUSTE A. HOUSQUAINS, M. D., of Paris.

Cases are far from rare in which the autopsy does not reveal, especially in children who have died suddenly, some other lesion besides enlargement of the thymus. Hence it is logical to state that there is a relation between cause and effect. On the other hand, when children die as the result of divers affections, the autopsy reveals at times, upon opening the thorax, a hypertrophied thymus which no functional disease during life betrayed as being present.

The obscurity which surrounds the clinical diagnosis of hypertrophy of the thymus has not been lessened by the many investigations which have recently been undertaken on behalf of this disease. Nevertheless, on account of the grouping of facts in connection with this disease, and which for the last two years have been thoroughly studied by the Pediatric Society and the French Association of Pediatrics, we are to-day in a position to group the symptoms so thoroughly that we are justified in speaking of a thymic syndrome. Truth to say, this syndrome consists of functional and physical symptoms peculiar to other affections. But it is equally true that it is not impossible in decisive cases to arrive at so precise a diagnosis that there is no doubt of its certainty.

A thesis recently prepared by M. Malavialle, of Montpellier, has brought out in an excellent manner this point of the question. His investigations, inspired by M. Marcel Ferrand, which were made in Paris whilst in the service of M. Variot at the Children's Hospital, are strengthened by quotations from numerous bibliographic sources. This thesis has so many good points that I have deemed it advisable to make frequent citations from it for the benefit of the readers of the JOURNAL.

At first it is necessary to advance the principle that there is no specific symptom in connection with hypertrophy of the thymus. Considered alone, each symptom which could be mentioned is fallacious; but at least it has to its credit that it calls the attention of the clinician to the case and goads him on to further researches, so that other signs may aid him in making a diagnosis. It is precisely on account of their grouping and their concordance that the signs of hypertrophy of the thymus acquire clinical value.

From a clinical standpoint, hypertrophy of the thymus can manifest itself by physical and by functional symptoms. The latter result principally from compression of the organs in the cervical region. As

to the physical signs, to find them is no easy matter and demands close attention. The functional signs are often in the respiratory apparatus and in the blood circulation. In the former one may observe dyspnea which may be permanent and may begin during the first weeks of life; often enough this dyspnea is accompanied by wheezing which can be detected both during inspiration and expiration, but principally during inspiration. When the dyspnea is decidedly marked, it is accompanied by elevation and depression of the substernal or even of the subclavicular regions and the intercostal spaces. It is interesting to note that in spite of the permanent compression exercised by the hypertrophied thymus, the dyspnea is not permanent; in certain cases, in fact, it is seen in the form of more or less violent crises, occurring at times with startling suddenness in a child apparently healthy. Frequently the attacks are nocturnal. The respiration stops suddenly, the child labors for breath and becomes cyanotic. The duration and the intensity of these crises are extremely variable; sometimes lasting only some seconds, and then many hours.

All those causes which may have a tendency to congest the thymus, such as infectious diseases, in particular measles and diphtheria, may aggravate the dyspnea or increase the number of the crises.

As to the circulatory complications, they result principally from the obstacles to the free venous circulation concomitant with an enlarged thymus. One notes at times cyanosis of the face, at times engorgement of the superficial veins of the neck with undue elevation of the subclavicular depressions. In extreme cases the circulatory interference may proceed up to a veritable cerebral congestion; the child then presents all the signs indicative of coma.

Besides the functional signs already mentioned, there are others which are much rarer, but which must be mentioned here lest the reader will think them of secondary importance. These are, for example, difficult deglutition, or, in other cases, the alterations in the timbre of the voice, and even the occurrence of aphonia.

The investigation of the physical signs ought to be made in a systematic fashion, if one wishes not to overlook information which may be of great importance from the point of view of a correct diagnosis. The examination of the patient shows at times, besides the deformities resulting from the difficulty in breathing and the signs of vascular compression, a condition which results directly from respiratory interference. Upon palpating the sternocostal region, one may ascertain a permanent asymmetrical arch down to the extremity of the manubrium of the sternum. Percussion reveals a zone of dullness at the two sternoclavicular articulations and at the upper part of the sternum. Percussion ought to be practised in a very gentle manner, if one wishes to note the shading in the fullness of the sound. It goes without saying that there should be an examination of the larynx and of the trachea when one suspects a hypertrophy of the thymus, the laryngoscope being the instrument used. As to tracheoscopy, the employment of which at present is rather limited, this method reveals in certain cases a depression of the trachea throughout many centimetres of its retrosternal portion. Another method of exploration, which should be more and more insisted upon on account of the important information which it gives, is radioscopy. This method may show an abnormal enlargement of the median shadow of the thorax, the shadow which is known as the thymic. In the cases in which hypertrophy of the thymus is distinct, the thymic shadow is very apparent

in the radiographic picture. Its position in the picture is in the median line, but it extends a little more to the left than to the right. It surmounts the cardiac shadow and is so closely connected with the latter that sometimes it is difficult to differentiate the contours which belong to one or the other. The thymic shadow has contours which are always clearly outlined, sometimes rectilinear, more often slightly curved; this shadow assumes the form of a trapezium or a quadrilateral with parallel sides, of which the angles are obtuse, the sides being sometimes scalloped, which is attributable to the lobulation of the gland. The thymic shadow is of equal density throughout its surface; it is compact, and of the same density as the cardiac shadow.

Such are the physical signs which permit the diagnosis of the existence of a hypertrophy of the thymus. None of these signs has an absolute value if isolated, but taken together they are of an undeniable importance, if their character, the mode of grouping or the intensity of the symptoms are studied.

A certain number of clinical manifestations of thymic hypertrophy have been described. These have been classified by M. d'Oelsnitz. In certain cases the sudden death may occur during sleep while the child is enjoying the best of health, or from no unusual cause, such as examination of the throat, a bath, or in the course of anesthesia; in the latter instance, death follows sometimes some minutes after the child falls asleep.

There are also the latent forms which manifest themselves suddenly by the appearance of accidents, more or less grave, that may prove a menace to life. These are sometimes severe attacks of suffocation, with difficulty of breathing and cyanosis. If interference is not prompt, death will result. M. d'Oelsnitz also calls attention to the silent forms which, by being intermittent, cause respiratory accidents, more or less intense, in the first months of the child's life: crises of suffocation of variable length which occur unexpectedly. The examination of the throat, of the larynx, and of the lungs is negative, but there exist a slight cyanosis of the face with dilatation of the superficial veins of the neck, sternocostal dullness, and an abnormal radiographic shadow.

The most usual forms are those in which the symptoms are constant with intermittent exacerbations; these, moreover, are the most favorable cases for observation of the physical signs and also for the useful intervention of surgery.

M. Marfan has described a cyanotic form of hypertrophy of the thymus.

Finally, there exist the forms of thymic hypertrophy associated with other affections, such as congenital wheezing, stridulous laryngitis, and spasm of the glottis.

By a critical study of the comparative value of all these symptoms, of which none is pathognomonic, the clinician is assisted in the diagnosis of hypertrophy of the thymus. All the symptoms, it may be stated, are inferential. Thus the symptoms of vascular compression indicate, purely and simply, a disturbance in the venous circulation, but without indicating the cause of the disturbance and this obtains in regard to other symptoms.

All the local signs of thymic hypertrophy are evidenced, whether the tumors are angiomatous, in the tuberculous ganglionic masses, or the truly sarcomatous sort that have pressed forward upon the manubrium of the sternum and the sternocostal articulations. The dullness, when

it occurs, cannot be differentiated from that which one finds in ganglionic hypertrophy, and ganglionic hypertrophy may co-exist with thymic hypertrophy.

In a large number of cases, the radiosopic examination is not faultless, since a defective technique or the lack of the proper immobilization of the child may enlarge or displace the shadow. Moreover, this shadow occurs in all retrosternal tumors, in goitres, in prevertebral abscesses, and finally, the thymic shadow may be confounded with the shadow of mediastinal adenopathy. But the ganglionic shadows are often not median. They are generally situated lower down, their contour is made up of a number of curved lines, and their density is unequal. They are accompanied by a trail of shadows or by isolated shadows at some distance.

All these points in regard to the difficulty in making a correct diagnosis should be remembered, since the symptoms of thymic hypertrophy do not yield the fullest knowledge; but by this it is not meant that their combined value should be belittled, for when taken together they are of great aid in making a correct diagnosis.

In conclusion, one can say with M. Ferrand that the clinical diagnosis of hypertrophy of the thymus is more often a diagnosis of probability than a diagnosis of certainty. Where there is a suspicion of the existence of this hypertrophy, all untoward symptoms should be carefully and systematically studied. Moreover, a thorough investigation should be made of all the symptoms in every case of laryngotracheal stenosis, and in vascular or nervous compression at the surface of the neck and at the upper part of the thorax, where these occur unexpectedly in the young child or in the nursling. By studying the comparative value of the signs and their manner of association, by eliminating successively all the affections which could be mistaken for thymic hypertrophy, the physician will be able to make a diagnosis, if not in all cases, at least in some, with a considerable degree of certainty. What should not be forgotten as the principal difficulty in achieving a correct diagnosis is the fact of the possible co-existence of other affections which present a symptomatology very similar to that of hypertrophy of the thymus. But this obstacle should not stand in the way of a thorough investigation of each and every case.

Despite the fact that a therapy has not as yet been devised for the cure of this ailment, despite the lack of scientific interest which attaches to this disease, the diagnosis in certain cases will at least be of prognostic value in cautioning the physician as to the real condition of the patient.

October 10th.

DIAGNOSTIC AND THERAPEUTIC NOTES.

DIAZO-REACTION AND PULMONARY TUBERCULOSIS.—Weisz (*Muench. med. Wochenschr.*, 1911, No. 25). There is still much difference of opinion regarding the prognostic value of the diazo-reaction in pulmonary tuberculosis, a more or less sceptical attitude being rather prevalent. Weisz, however, is firmly convinced of its value especially in the modified form introduced by him. According to him, the substance which gives the positive diazo-reaction is a urochromogen, that is, a substance representing a lower stage of oxidation of urochrom, the normal yellow coloring matter of the urine. Weisz's test for urochromogen consists in diluting the urine three times with water and adding three drops of a one-tenth per cent. solution of potassium permanganate. The urochromogen is oxidized to urochrom and a yellow color results. This test may be substituted for Ehrlich's diazo-reaction and possesses certain advantages over the latter.

The cause of a positive urochromogen reaction, Weisz considers to be an inflammatory destruction of cellular tissue, and this, in pulmonary tuberculosis, means a progressive infection. Hence, a positive reaction in even a single specimen of urine is an unfavorable sign, and the more frequently or more constantly the reaction occurs the worse the prognosis. In general, too, it may be said that cases with a positive diazo- or urochromogen-reaction are unsuitable for tuberculin therapy and that, when in the course of a series of tuberculin injections a positive urochromogen reaction appears, the dosage of tuberculin is too high. The only method of treatment that promises results, in cases of positive diazo- or urochromogen-reaction, is the production of an artificial pneumothorax. Muralt, Brauer and Spengler have reported cases with positive diazo-reaction in which the improvement, following this method of treatment, was accompanied by a disappearance of the reaction.

ON THE USE OF INCREASING DOSES OF ARSENIC.—Cloetta (*Korrespondenzbl. f. Schweiz. Aerzte*, 1911, No. 21). In the prolonged administration of arsenic it is customary slowly but steadily to increase the dose, so that finally the patient may be taking quantities which, if given at the beginning of the treatment, would have been strongly toxic. It has been assumed that a progressive immunity to arsenic occurred, the nature of which has always been obscure. Cloetta has shown, by means of a very interesting series of experiments on dogs, that this immunity is only apparent, not real. In one dog, which at first was very sensitive to arsenic, he was able, in the course of two years, to increase the tolerance to such a degree that 2.6 gm. of arsenious acid was taken daily without disturbance. It appeared, however, that this apparent tolerance was due entirely to a steadily increasing impermeability to arsenic of the gastrointestinal mucous membrane. Indeed, while the large dose just mentioned

was administered, all but 0.13 per cent. of the arsenic passed through with the stool, so that the dog absorbed only a little over 3 mgrm. or gr. 1/20 daily. When this animal was given 1/60 of the daily dose hypodermically, he promptly died of acute arsenic poison.

Cloetta draws a number of interesting conclusions from his observations, not all of which can be detailed here. He finds evidence that arsenic is a most useful tonic, increasing the nitrogenous and fatty content of the individual cells. He states that the drug should always be given in solution and believes that where it fails to produce any effect, this may be due to a congenital or acquired impermeability of the intestinal wall to the drug. To such patients it should be given hypodermically.

SYPHILITIC REINFECTION AFTER SALVARSAN.—Krefting (*Deutsch. med. Wochenschr.*, 1911, No. 31), Geyer (*Ibid.*, 1911, No. 33). When Ehrlich's salvarsan was first put upon the market, it was welcomed with enthusiasm. It was hoped that a remedy had been found, a single injection of which would completely cure every case of syphilis. This hope has proved fallacious, and salvarsan, while still considered valuable, is taking a place subordinate to the systematic use of mercury and iodides. In a certain small number of cases, however, Ehrlich's expectations are being fulfilled, and permanent cures are resulting from the use of salvarsan alone. These cures have been demonstrated in the only unmistakable manner, that is, by the occurrence of a fresh primary lesion, at a proper interval, after suspicious intercourse. In Krefting's case, a man with unmistakable syphilis had received three injections of salvarsan, with complete disappearance of the lesions and permanently negative Wassermann reaction. Some 19 weeks later, two new chancres appeared near the old scar, both rich in spirochætae and with strongly positive Wassermann reaction.

In Geyer's case, the patient was cured by salvarsan after having infected his wife. Some time later he was reinfected by the latter, with the appearance of a typical primary lesion and a reappearance of the positive Wassermann reaction.

HUMAN HAIR AS SUTURE MATERIAL.—Sofoteroff (*Zentralbl. f. Chir.*, 1911, No. 21). The writer advocates the use of woman's hair in vascular surgery, in which very fine, yet strong, thread is required. The hair is boiled in a solution of soda and is preserved in paraffine-vaseline. Hair so prepared was examined bacteriologically and found sterile.

THE INTRAVENOUS USE OF BICHLORIDE.—Bacelli (*Il Policl.*, 1911, No. 13). Some years ago, Bacelli introduced into medicine the intravenous use of bichloride of mercury. In a recent communication he expresses himself enthusiastically regarding the value of this procedure, not only in syphilis, but also in a variety of other conditions, especially those not infrequent cases of septicemia in which the responsible micro-organism remains obscure. Even where the infection was so severe that the patient's condition seemed hopeless, Bacelli has obtained almost miraculous results. In every desperate infection, he maintains, these injections deserve a trial. He uses the following formula:—

Hydrargyri bichlorid.	0.01
Sod. chlorid.	0.075
Aq. sterilisat.	10.0

This amount is slowly injected into a vein. The temperature usually falls promptly and the patient's general condition improves. The same dose may be injected three times within twenty-four hours.

A NEW TEST FOR INDICAN.—Barberio (*Il Policl.*, 1911, No. 17). The various tests for indican differ chiefly in the oxidizing agent used. Barberio advocates the use of sulphurous acid, in the form of sodium sulphite dissolved in distilled water in the proportion of 1 to 2,000. To 5 c.cm. of filtered wine, a few drops of this solution are added, the mixture shaken and then mixed with 5 c.cm. strong HCl and 2 c.cm. chloroform. The chloroform takes on a blue color whose intensity depends, in the absence of iodine, upon the amount of indican in the urine. If iodine is present, the addition of a crystal of sodium thiosulphate suffices to decolorize it.

A NEW SIGN IN RECURRENT APPENDICITIS.—Wolkowitsch (*Zentralbl. f. Chir.*, 1911, No. 22). In a large number of cases of recurrent appendicitis, the writer has noted a phenomenon that appears to him to be of diagnostic value. In these cases, the broad muscles on the right side of the abdomen are in a condition of atony, sometimes verging upon atrophy. This atony can readily be perceived by palpation and can be quantitatively measured by means of the apparatus of Exner and Tandler.

DIGITALIS GELATINE.—Herz (*Muench. med. Wochenschr.*, 1911, No. 26). At a meeting of the Vienna Medical Society of May 26th, Herz made a provisional announcement of a new preparation of digitalis that bids fair to become of importance. The powdered, titrated digitalis leaves are macerated in water and then imbedded in gelatine. In this state, the leaves retain their original activity for a long time. The mass, which of course is fluid when warm, is cast into small bean-shaped portions, each of which contains 0.05 gm. pulv. fol. digit. These beans are then exposed to formaldehyde vapor which hardens their surface and renders them insoluble in the stomach contents. They thus pass the stomach unchanged, causing no gastric irritation and are slowly dissolved and absorbed in the intestine. Clinically, this form of digitalis medication has proved very satisfactory.

TWO NEW SIGNS OF PLEURISY.—Schepelmann (*Berl. klin. Wochenschr.*, 1911, No. 24), Sternberg (*Ibid.*). The former calls attention to the observation that in dry pleurisy the pain is increased when the patient bends his body towards the well side, whereas in intercostal neuralgia the pain is increased by bending the body towards the affected side. Sternberg considers a sensitiveness to palpation of the muscles of the shoulder girdle a valuable diagnostic sign in pleurisy. It increases or diminishes in intensity as the pleuritic inflammation grows worse or better.

BOOK REVIEWS.

ALLGEMEINE MIKROBIOLOGIE. Die Lehre vom Stoff-und Kraftwechsel der Kleinen. Für Aerzte und Naturforscher dargestellt von Dr. med. Walther Kruse, O. Professor und Direktor des Hygienischen Instituts an der Universität Königsberg in Preussen. Paper, 1184 pp. Leipzig: F. C. W. Vogel. 1910. Price, 22 m.

Kruse's "Allgemeine Mikrobiologie" presents a most careful study of this intricate subject; and even after a rather hasty perusal of this volume the reader can readily understand why it has taken the author the greater part of eight years to complete it. The book may be looked upon as the fourth edition of Flügge's "Mikroorganismen," Kruse already having written the greater part of the third edition. Two future volumes will contain treatises on "Infection" and on "Immunity." The author presents the entire subject-matter from the point of view of the biologist and pathologist; the hygiene and the diagnostic and therapeutic application of the principles of microbiology are considered of minor importance in this volume. A full comprehension of pathological chemistry is the *sine qua non* of a correct conception of infectious diseases, and, to a large extent, of all physiological functions. While there are a number of good works accessible on physiological chemistry, viz.: Bunge, Hammarsten, Abderhalden, etc., detailed information on the various processes of decomposition of the carbohydrates and the various nitrogenous bodies, the action of ferments, the oxidizing and the reducing processes, the microörganismal poisons, etc., in a collective work, are obtainable only with difficulty by the average practitioner. Aside from Vaughan and Novy's, and the more modern Well's, treatises on pathological chemistry, the ready accessible literature is rather meagre.

Kruse's book furnishes a reliable fund of sound information enhanced by a good index and many valuable references. It is a work that cannot but prove of the greatest assistance to those students who have dabbled in this fascinating chapter in medical science; and even those who may think that their knowledge is complete will soon learn that from this monumental work may be drawn the complementary information which will round out what they had supposed was the necessary mastery of this subject.

SURGERY OF THE UPPER ABDOMEN. Surgical Diseases of the Stomach, Duodenum, Pancreas, Liver, its Ducts including Gall-Stones, their Diagnosis, Technique of Operations and After-Treatment. By John B. Deaver and Astley P. C. Ashhurst, M. D., Surgeon to the Out-Patient Department of the Episcopal Hospital. With many original illustrations. In two volumes. Vol. I.—The Stomach and Duodenum. With 76 illustrations, several of which are printed in colors. Philadelphia: P. Blakiston's Son and Co. Cloth, \$5.00; Half Morocco, \$6.50.

The plan of this book is well laid out, and includes a review of the opinion of the authorities in surgery upon the diseases of the upper abdomen as well as an expression of an opinion of the authors, whose experience, particularly that of the senior author, has been most extensive. In this first volume, the surgery of the stomach and duodenum is completed, and the treatment of the various sub-heads is thoroughly and most clearly dealt with. Appended to each subdivision is a list of all the references to that particular subject, which adds immensely to the value of the work. A large part of the book is devoted to the review of the operative measure employed in gastric and duodenal surgery. There are also an interesting discussion of the complications and sequelæ after operation, and a general consideration of the physiology, digestion, and the particular points of information as they apply to the stomach and duodenum. The second volume is not yet complete, and will deal with Surgery of the Liver, Gall-Bladder, Pancreas, and Spleen.

DIE KLINIK DER TUBERKULOSE. Handbuch der gesamten Tuberkulose fuer Aerzte und Studierende. Von Dr. B. Bandelier und Dr. O. Roepke. Wuerzburg: Curt Kabitzsch. 1911. Price, m. 9.50.

The above work is a product of many years of the author's personal experience with tuberculin in diagnosis and treatment. It has been written for practitioners and is designed to afford in a clear and simple way what is essential in order to obtain the successful results with tuberculin and, what is more important, the avoidance of its harmful effects. It deals with all the preparations and methods, with the exception of such as are of ephemeral interests, known to exert a specific reaction on tuberculous diseases. It considers in special detail those remedies which have already proved themselves of much service, giving their mode of action, application, indication, and counter-indications. Besides considering the specific reactions and treatment of those in general, it summarizes other preparations concerned in the production of active or passive immunity to tuberculosis with special mention of their application to local tuberculous lesions. The clearness of description of these products and of their application should create a wide circulation for this book among those who are not particularly acquainted with specific methods of diagnosis and treatment of this disease. Considered in the light of recent advances, particularly with regard to the diagnostic value of local tuberculin reactions, this book could not be considered authoritative. It is, however, to be regarded, on account of its general character and the wide scope which it covers in so small a space, as one worthy of careful study.

THE GOULSTONIAN LECTURES ON THE SENSIBILITY OF THE ALIMENTARY CANAL. Delivered at the Royal College of Physicians on March 14, 16 and 21, 1911. By Arthur F. Hertz, M. A., M. D. (Oxon.), F. R. C. P., Assistant Physician and Physician in Charge of the Department for Nervous Diseases, Guy's Hospital. New York and London: Oxford University Press. 1911.

This is an important piece of work. The sensibility of various portions of the digestive tract to different stimuli was carefully tested, the upper and lower portions on normal individuals, the gastric and intestinal mucosa in patients in whom artificial openings have been made for one reason or another. Among other interesting conclusions, the writer found that tactile sensation is limited to pharynx and anus, while heat and cold can also be felt in the esophagus—not in the stomach. Acids are felt nowhere; alcohol everywhere produces a sensation of warmth. The surface of gastric and intestinal ulcers is no more sensitive to tactile, thermal and chemical stimulation than the intact mucous membrane. The sensation of fullness in the alimentary canal is due to a slow increase in the tension exerted on the fibres of its muscular coat. The only immediate cause of true visceral pain is tension exerted on the muscular coat of hollow organs, and on the fibrous capsule of solid organs.

The experiments upon which these and other conclusions are based are of much interest. The book, which is short and can easily be read in an hour, will well repay perusal.

A MANUAL OF CLINICAL DIAGNOSIS. By Means of Laboratory Methods for Students, Hospital Physicians, and Practitioners. By Charles E. Simon, B. A., M. D., Professor of Clinical Pathology and Experimental Medicine at the College of Physicians and Surgeons; Pathologist to the Union Protestant Infirmary and the Hospital for the Women of Maryland; Clinical Pathologist to the Mercy Hospital of Baltimore, Maryland. Seventh Edition, Enlarged and Thoroughly Revised. Illustrated with 168 Engravings and 25 Plates. Philadelphia: Lea and Febiger. 1911. Price, \$5.00.

The present edition of Simon's "Clinical Diagnosis" contains an interesting novelty. The book is divided into two parts. Of these, the first represents the technical portion and is not unlike the preceding edition, with the addition of new material and the exclusion of other matter that has become superfluous. Part II, which is altogether new, is a series of clinical pictures from the laboratory point of view. Under the heading of the various diseases, arranged in alphabetical form, the laboratory findings are described concisely but completely, thus supplementing usefully the more detailed discussion of the first part. The book should prove equally useful to student and practitioner.

HANDBOOK OF TREATMENT FOR DISEASES OF THE EYE. By Curt Adam, Assistant Surgeon in the I. University Clinic for Diseases of the Eye, Berlin. With a Preface by Professor von Michel, Berlin. Translated from the Second German Edition (1910) by William George Sym, M. D., F. R. C. S., Ed., and E. M. Lithgow, M. B., F. R. C. S., Ed. With 36 illustrations. New York: Rebman Company. Price, \$2.50.

As the title implies, this handbook of Dr. Adam's deals primarily with the treatment of eye diseases and injuries. A general knowledge of the diagnosis of eye conditions is assumed. The author makes very plain the distinction between those eye diseases a general practitioner may treat with propriety and those which call for immediate reference to a specialist.

The first edition, which appeared in 1908, was rapidly exhausted and in 1909 a second edition, with additions bringing the therapeutics up to date, was prepared by the author.

It is this edition, ably done into English by Sym and Lithgow, that is under review. Dr. Adam appreciates the viewpoint of the general practitioner in relation to diseases of the eye, and well understands the sort of questions that are constantly arising in the latter's mind.

The book admirably fulfils the purpose for which it was intended.

MINOR AND OPERATIVE SURGERY INCLUDING BANDAGING. By Henry R. Wharton, M. D., Professor of Clinical Surgery in the Woman's Medical College of Pennsylvania; Surgeon to the Presbyterian Hospital, and the Children's Hospital, etc. Seventh Edition, enlarged and thoroughly revised, with 555 illustrations. Philadelphia: Lea & Febiger.

It is probably very hard for an author of a textbook that has gained favor and passed through several editions to make such changes as are consistent with the more modern times, and in this work this is the case. For instance, more space is given to the obsolete practice of wet cupping than is given to the modern procedure of direct transfusion of blood. For giving the student a fairly well-arranged scheme for studying surgical procedures, the book has some value, but as a guide to surgeons or practitioners its chief value will be found in the section on bandaging. As to important surgical operations the work is far from adequate. Minor surgery, however, is well handled, and properly speaking the book ought to be called "Minor Surgery and Bandaging."

MANUAL OF DISEASES OF THE EYE. For Students and General Practitioners. By Charles H. May, M. D., Chief of Clinic and Instructor in Ophthalmology, College of Physicians and Surgeons, Medical Department Columbia University, etc. Seventh Edition, Revised. With 362 Original Illustrations including 22 plates, with 62 colored figures. New York: William Wood & Co. 1911. Price, \$2.00.

Dr. May's well-known "Manual of Diseases of the Eye" now appears in its seventh edition. We are assured that the text has been carefully examined and numerous paragraphs added on such subjects as the trachoma bodies, Lagrange's operation for glaucoma, the use of salvarsan in syphilitic ocular affections, injections of tuberculin, and Kronlein's operation. A new chapter on the "Ocular Manifestations" in general diseases also appears in this edition. Further comment on this manual, so well and favorably known, would be superfluous.

EDUCATION AND PREVENTIVE MEDICINE. By Norman Edward Ditman, Ph. D., M. D. New York: The Columbia University Press. 1911. Price, 25c.

This moderate-sized pamphlet of some seventy pages should prove a mine of information for the social worker. The author takes up in succession each of the commoner diseases and describes the preventive measures that are applicable to them, and the results that have hitherto been obtained in this regard. Some of the statistical diagrams, with which the monograph is profusely illustrated, do not quite demonstrate what they are supposed to do, but that is characteristic of many collections of statistics. The author concludes by a plea for a School of Preventive Medicine, not only for physicians, but still more for legislators and social workers.

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BOOKS RECEIVED.

- THE CONQUEST OF NERVES. By J. W. Courtney, M. D. New York: The Macmillan Company. 1911. Price, \$1.25.
- HERSELF. Talks with Women Concerning Themselves. By E. B. Lowry, M. D., Author of "Confidences," "Truths," etc. Chicago: Forbes & Co. 1911.
- VERHANDLUNGEN DES VEREINS DEUTSCHER LARYNGOLOGEN. 1911. Herausgegeben vom Schriftfuehrer Dr. Richard Hoffmann—Dresden. Wuerzburg: Curt Kabitzsch. 1911. Price, 7 m.
- PRINCIPLES OF ANATOMY. The Abdomen Proper, described and illustrated by Text and Plates. By Wm. Cuthbert Morton, M. A., M. D., Edin. New York: Rebman Company. 1911. Price, \$12.00.
- CESARE LOMBROSO: A Modern Man of Science. By Hans Kurella, M. D., Author of "Natural History of the Criminal," etc. Translated from the German by M. Eden Paul, M. D. New York: Rebman Company. Price, \$1.50.
- THE CONCISE OXFORD DICTIONARY OF CURRENT ENGLISH. Adapted by H. W. Fowler and F. G. Fowler, Authors of "The King's English" from The Oxford Dictionary. New York: Oxford University Press. 1911. Price \$1.00.
- THE MECHANISM OF LIFE. By Dr. Stéphane Leduc, Professeur à L'Ecole de Medecine de Nantes. Translated by W. Deane Butcher, Formerly President of the Roentgen Society and of the Electro-Therapeutical Section of the Royal Society of Medicine. New York: Rebman Company. Price, 2.00.
- THE PARASITIC AMOEBAE OF MAN. By Charles F. Craig, M. D., Captain, Medical Corps, United States Army. From the Bacteriological Laboratory of the Army Medical School, Washington, D. C., and the Rockefeller Institute for Medical Research, New York City. Published with the Authority of the Surgeon-General of the United States Army. Philadelphia and London: J. B. Lippincott Company. 1911. Price, \$2.50.
- A MANUAL OF PATHOLOGY. By Guthrie McConnell, M. D., Professor of Pathology and Bacteriology, Medical Department, Temple University; Assistant Pathologist to the Philadelphia City Hospital; Formerly Pathologist to the St. Louis Skin and Cancer Hospital and Bacteriologist to the Missouri State Board of Health. Illustrated. Second Edition. Thoroughly Revised. Philadelphia and London: W. B. Saunders Company. 1911. Price, \$2.50.
- INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles by Leading Members of the Medical Profession Throughout the World. Edited by Henry W. Cattell, A. M., M. D., Philadelphia, U. S. A., with the collaboration of Wm. Osler, M. D., Oxford; John H. Musser, M. D., Philadelphia, etc., etc. Volume III. Twenty-first Series, 1911. Philadelphia and London: J. B. Lippincott Company. 1911. Price, \$2.00.
- MANUAL OF PATHOLOGY. Including Bacteriology, The Technic of Post-mortems, and Methods of Pathologic Research. By W. M. Late Coplin, M. D., Professor of Pathology, Jefferson Medical College, Philadelphia; Medical Director of the Jefferson Medical College Hospital, etc. Fifth Edition, Rewritten and Enlarged. With Six Hundred and Twelve Illustrations and Twelve Plates, Eleven of which are in Colors. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$4.50.
- LEHRBUCH DER SPEZIFISCHEN DIAGNOSTIK UND THERAPIE DER TUBERKULOSE. Fuer Aerzte und Studierende. Von Dr. Bandelier, Chefarzt des Sanatoriums Schwarzwaldheim in Schomberg bei Wildbad, und Dr. Roepke, Chefarzt der Eisenbahnheilstaette Stadtwald in Malsungen bei Cassel. 6. Erweiterte und Verbesserte Auflage. Mit Einem Vorwort von Wirkl. Geh. Rat Prof. Dr. R. Koch, Exzellenz. Mit 19 Temperaturkurven Auf 5 Lithographischen Tafeln, 1 Farb. Lith. Tafel und 5 Textabbildungen. Wuerzburg: Curt Kabitzsch. 1911. Price, paper, 6.60 m., cloth 7.80 m.

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EDITORIAL.

THE ORGANIZATION OF HOSPITAL STAFFS.

There are few physicians in actual practice to-day whose professional work does not lead by some path or other through the doors of some hospital. Therefore, any discussion which deals with the best methods of hospital administration should afford interest to a very wide circle. Within the last few months several articles relating to the organization of medical and surgical staffs have appeared, and have thrown light on the method by which some of the best managed hospitals in the country are governed. All these discussions, while differing in minor details, are strikingly unanimous in their underlying principles, and all show a definite attempt to adopt business administration ideas to their particular problems. The saddest comment which can be made on the medical organization of hospitals, and one which unfortunately is too often called for, is that they are frequently run on the principle of the laws of entail. At one time most of the institutions in a great city were family affairs in which *pater familias* dispensed positions as freely as honors were bestowed under the feudal system; but now most large hospitals realize the folly of such a system, and are yielding to the fundamental ideas of civil service. That efficiency should be the only qualification for position on a hospital staff is an axiom which forms the basis for the scheme now to be outlined. Unless political influence, graft with the board of directors or other powers, can be eliminated, there is no use attempting to establish a working whole devoted entirely to the interests of the institution.

In all large hospitals dealing with public patients, whether privately endowed or under municipal or county control, the various services are sharply defined, and each is a unit unto itself. The general laws applying to one unit will, with slight modifications, apply to all. It seems to

be generally agreed by every one interested in the problem that the highest efficiency can be obtained only when each service is under the control of one man. This "head of the department" must have under his wing several associates whose duties, whether in the ward, the operating room, the dispensary, or the laboratory, are such as bring him into direct contact with some or all of the patients. If the hospital is connected with a medical school—as, in our opinion all hospitals dealing with public patients should be,—then the various associates on the staff will have duties bringing them into direct contact with the students. It is an accepted fact in all business administration that perfect efficiency is possible only by division of and specialization in labor; and while one man can easily enough work his way through all steps of the system, he is, during the time of his association in one department, a specialist in the work of that department. So it should be in a hospital if the institution is to amount to anything more than a mere haven for the tired or sick poor. One attending man on a service at a time in a large hospital cannot possibly look after the mere physical needs of his patients, much less direct and initiate those studies along lines of clinical research which rightly should emanate from a first-class hospital. The younger men on the staff, men whose practices are perhaps not yet overwhelming, can and should be given the task of directing the various fields of action necessary in a large clinic.

The value of specialization can be seen no better than in the relation of clinic to laboratory. The time has passed when all the laboratory work of a hospital can be classed under the head of pathology, and done by one man—often a practitioner paid a small salary for a part of his time daily; but such hospitals still exist as a blot on the escutcheon of American medicine. It is a crying disgrace that large publicly managed institutions can exist in this country with laboratory facilities such as would be considered eminently insufficient for the smallest of German clinics. Not only is the field of post mortem and surgical pathology woefully neglected in some of our country institutions, but the even more important field of so-called clinical pathology is frequently occupied by a junior interne working under no general. From every standpoint, be it that of patient, attending man, or institution, the special part of laboratory work dealing directly with the patients should be under the direction of a man who also is intimately associated with the patient; and the most feasible scheme for attaining this end is by having the work controlled by one of the associates especially assigned to this division. What has been said about the laboratory holds as well for any other department of a service, and the men who have been studying the problem recognize the prime importance of the idea and recommend its adoption.

Naturally, details of organization must vary with the needs of the institution. For small private hospitals conducted by physicians or surgeons for their private cases, no rules can be laid down. It seems, however, well worth the attention of all American physicians to study ways and means of improving our public hospitals so that they may occupy the positions in the advance of medical ideals which they rightly should.

A NEW FIELD FOR LIFE INSURANCE EXAMINATIONS.

Annual life insurance examinations now seem about to become an ordinary routine of business if we are to believe the preliminary statements of some of the companies. Of course the best sign of good health is the very fact that the man never gives it a thought; if he does think of it, except in a casual way, he surely is sick and in need of treatment. The illness may be merely an exhaustion, but it is the trivial things which become serious with time. No machine is ever allowed to run long without a critical examination to find if there is not a worn or damaged part which does not give symptoms, but which constitutes a weak spot, sure to break under an extra strain, and needing to be strengthened. Examinations also show if there is undue wear from some tiny loss of adjustment or alignment, and this is where the analogy to man is very close, for he too wears in spots if he is out of adjustment. A very slight change in a machine's position or a man's method of work makes all the difference in the way of smooth running, increased efficiency, and prolonged work-life.

Mere lengthening of life is not desirable of itself, for nothing is more miserable than a long life of invalidism, yet the primary purpose of the proposed periodic life insurance examinations is to prolong life and thus cheapen insurance to all. The only one whose estate receives exactly what he paid out in dividends is he who lives the average time, not counting of course the expenses of management, which probably are less than if he saved the money and invested it himself. Those who live the longest pay out more than the estate gets back, and if one were sure he would live and save, it would be cheaper not to insure. As no one knows when he will be called, no one can run the risk of dying before he has provided for his family, and we all must insure. Besides, few save except under compulsion. Those who live the longest need not fret about having paid too much for the insurance, but may thank heaven they are the instruments of charity to the widows and orphans of those who die prematurely. It is really the mutual aid upon which social organization is

based. If we could only prevent agents from working on one's fears and inducing a man to take out more insurance than he can carry, thus losing most of it when he surrenders the policy; and if we could end those companies which charge too little and go to the wall when the time comes to pay off the early policies, insurance would be cheaper still. As it is a social necessity, it must be put within the reach of all, to end the present intolerable burdens of supporting the helpless and paupered.

Prolongation of efficiency is the real purpose of annual examinations. Death in harness is the ideal end; that is, our duty is to make a man an efficient worker all of a long life, and not merely patch him up to live after all working power is gone. We can do this by periodical examinations to find out where the machine is wearing from undue friction. We need not be afraid of turning men into introspective cranks, for if they are healthy they immediately forget all about the examination, and if really ill, they must take heed. It is the neglected who become unduly solicitous. Military services the world over are making it a rule to examine frequently to exclude the unfit, and, as far as known, it is doing a world of good in the direction of preventing unfitness, so that there will be fewer retirements, not more. We might, then, suggest that these new life insurance examinations take on more of the nature of increasing and prolonging efficiency as well as mere life. They are more than public health measures, and we are safe in predicting that the new movement will become universal. Not only that, but compulsory examinations will go hand in hand with the compulsory universal insurance now part and parcel of the highest civilizations. Our boasted individualism is at an end, not only because it is too expensive, but also because it is inefficient. We are more and more dependent on society, and must play fair or we will be outcasts. It is a man's duty to society to avoid the damages which make him a pauper. He must keep himself in the harness as long as possible. It does seem that life insurance medical men are destined to fill a much larger place in civilization than their original one of preventing insurance to those who are liable to die soon.

By the way, too, it is high time that some kind of insurance be devised for the "uninsurable." Indeed, as it is a social necessity, there should be no difficulty in creating a new class with special premiums, and if the man does outlive expectations, then increase his policy according to payments already made. So many uninsurable men live past sixty that it is bad business to let them go uninsured. It is possible for every man to get insurance—even if incurably diseased—so let it be done at once. Our actuaries could easily calculate premiums to be paid without any examinations at all—merely stipulating that the longer one lives the bigger will

be the death payments, and the less the premiums. "Grave-yard insurance" would never be heard of, if this old suggestion could be made practicable.

In addition to all this, it has been fully predicted that life insurance examiners will take on the role of sanitary inspectors, for they may find the primary causes of early disease, whereas the physician called in long afterwards, when symptoms are pronounced, may be puzzled or even baffled if the primary cause has been removed. In every way we look at it, the extension of insurance to every one is bound to make profound social changes. We might also remark that if people are to be given public aid when sick, as the English government proposes, it will be a crime to make one's self sick, and a misdemeanor to neglect preventive measures. Consequently, the observance of hygiene and sanitation will probably be much more compulsory than now. Public health cannot fail to be improved where it is criminal to neglect ways of preserving health, efficiency and life, and to become a public burden. So let us have more insurance and more examinations. The companies are more than public utilities; they seem destined to be part and parcel of the social machine itself.

SOME NEW TESTS FOR CANCER.

Some time ago we called attention in these pages to a new test for cancer of the stomach, the "glycyl-tryptophan" reaction of Neubauer and Fischer, as well as to the modification proposed by Weinstein, of New York. At the time of the publication of the original note sufficient observation had not yet been made to allow a just estimate of the value of the test. Since then a very extensive literature has accumulated, which has recently been judicially reviewed by Weinstein. As usual with the new things in medicine, the period of enthusiasm was followed by much discouragement, and considerable skepticism, and even now opinion is far from settled on the exact value of the reaction. Warfield was the first to explain some of the apparent discrepancies by the assumption that saliva swallowed and then removed as part of a test meal would act in respect to the test just as the proteolytic ferment of cancer, and consequently would be a source of grave error in the interpretation of the results obtained with the original test of Neubauer and Fischer. Weinstein, however, found by direct experiment that saliva had no effect on the validity of the test applied according to his modification. This modification, it may be remembered, consists in excluding the addition of glycyl-

tryptophan to the gastric contents, thereby considerably simplifying the technique. It is assumed that if the cancer ferment is present, tryptophan will be demonstrable as a result of the action of the ferment on the food in the stomach. With this change in technique, Weinstein has obtained results of comparative but not absolute value, but most other investigators are less satisfied with even its comparative usefulness.

Based on the same principle that cancer cells secrete a ferment capable of splitting protein, Morris of St. Louis, has attempted to find a means of making a definite diagnosis of malignancy in ascitic fluids. At present even the best methods at the command of the laboratory worker cannot give much information concerning the nature of such fluid, and all specific tests so far have proved worse than useless. Morris has found, in a small series of cases studied, that in malignant disease of the peritoneal cavity, the fluid contains considerably more incoagulable nitrogen than does the fluid from other conditions. To remove the coagulable nitrogen is by no means a simple procedure, and as at present conducted cannot be performed outside of a well-regulated laboratory. But the principle is so sound that it seems to us to promise very well, and undoubtedly subsequent work will simplify the technique.

OPINION AND CRITICISM.

SPORADIC TRICHINOSIS.

"An epidemic of a disease like typhoid fever following close on to a picnic should suggest an epidemic of trichinosis." Words similar to these are found in a well-known textbook of practice. The writer of this note well remembers, in the wards of a large institution where trichinosis was extremely rare, a patient lying for some time with suspected typhoid fever without the specific blood findings. A belated differential count showing an eosinophilia finally led to the correct diagnosis of trichinosis. Many cases of trichinosis are probably diagnosed as typhoid fever in the early stages, or as peripheral neuritis in the later periods,—and the mistake is made usually because the real disease is not being looked for.

As a matter of fact, the diagnosis of trichinosis is far from difficult, and more cases would undoubtedly be met with were the clinical syndrome emphasized. Often epidemic in a group of persons who have been eating infected meat, it may and often does occur sporadically in an individual who does not even remember pork in his dietary. An onset much like typhoid fever with malaise, fever, slight edema of the eyelids, general or local muscle pains, a trace of albumen in the urine, and an eosinophilia, almost always spells a trichina infection. The muscle pains are often not found till later, but the study of the blood showing the abscess of typhoid reactions and the presence of a large increase in the eosinophiles with the edema of the eyelids and trace of albumen make a clinical syndrome. This combination is not met with in any other infection. If this group of signs and symptoms is present, a case of sporadic trichinosis must be considered, and subsequent development of muscle pains should lead to the finding of the trichina in a piece of excised muscle. The excising of a small fibre of muscle is attended with so little discomfort that most patients do not object to the "harpooning process"; and the remainder of the technique is very simple. The small piece of muscle is teased, put on a glass slide, and examined under the low power of the microscope.

The importance of diagnosing trichina infections is not limited to the scientific value of a correct diagnosis. Realizing, as we do nowadays, that parasitic diseases are much more common than was formerly considered, every effort should be made to study their modes of infection so as to limit their incidence. In trichinosis we are dealing with a process, the details of which are accurately understood: primarily a food infection

from uncooked pork, then a general blood infection, with final localization in the muscles—and it is not difficult to see that any successful combat with it must be prophylactic in nature. Whenever possible, every case should lead to a study of the source of infection, so that such a focus may be wiped out of existence.

THE SIGNIFICANCE OF FEHLING'S OR HAINES' TEST.

Graduates of many medical schools taking examinations for positions as internes are prone to say that the diagnosis of sugar in the urine rests on the reduction of copper sulphate; that a positive Fehling's, Haines,' or Benedict test means sugar. "Oh yes! other things reduce copper sulphate, but practically the test means sugar." The result of such an attitude is an erroneous diagnosis of diabetes, and the loss of many rare cases in which reducing bodies other than glucose are found in the urine. Broadly speaking, it is true that a copper reduction means sugar, and for practical purposes can be so interpreted; but from the standpoint of scientific accuracy it is far from true. Not only do many other sugars besides glucose reduce copper, but various other products of metabolism may occur in the urine and give the reaction. This is especially the truth when the reduction is "incomplete" or "atypical," and here a knowledge of the other possibilities may save a reputation or a patient. Men of large experience in urine analysis find many instances where a copper reduction reaction standing alone is insufficient for diagnostic purposes, and where a more complete study is necessary. Likewise in those clinics where a routine examination requires identification of all reducing bodies, the complete study often reveals some unusual form of metabolic disturbance of more than enough scientific interest to pay for the trouble of looking for it.

Our object in thus writing is to emphasize the point that, whenever possible, urines containing a reducing body should *at least once* be submitted to careful examination. Of course it is not always, or perhaps even often, possible for the physician to have polariscopic examinations and fermentation tests performed, although there is hardly a neighborhood which has not a laboratory capable of doing these tests. But the practitioner cannot be expected to go into these details, even though he realizes their importance. It is up to hospital laboratories to insist on a more rigid standard in urine work and to demand that "copper reduction" mean "copper reduction." In this way only can our hospitals add to the ever interesting literature on carbohydrate metabolism their share of studies on the rarer reducing bodies.

LITERARY NOTES.

It is not often that this column contains criticisms of novels, but when a novel is interpretative of certain social conditions, which are familiar to all observing physicians a further apology is unnecessary. "The Dangerous Age" by Karin Michaelis (John Lane Company, New York) is not written on conventional lines; if it were one could dismiss it with a few words. Nor is it exquisitely written in a tempo that would proclaim the authoress an artist in words. But it is a truthful book; truthful of the conditions of to-day which manifest themselves in that social unrest with which the medical world is not unacquainted. That the book is a medical document, such as a physician gifted with a literary grace would write, is not to the point, since we are sure the authoress lays no claim to this distinction; but that, in the words of Marcel Prevost, the distinguished French *littérateur*, "the book owes much to them [doctors] and to medical science" there can be no doubt. And this being the case it would be well for all physicians, whose readings are miscellaneous, to read this book if only to learn to what extent certain modern interpretations of hysteria have penetrated into the realm of belles-lettres. Whether or not we agree with the Danish authoress in all she says, we are not surprised at the wide success of her book—Germany and France have read nothing else in the last twelvemonth—for here we have mirrored chapters from our textbooks with the additional attractiveness of a literary touch that carries conviction with it.

In the "Biographical Reminiscences of Sir Samuel Wilks" (Adlard and Son, London) a new note in biography has been struck, and one that should give all aspiring biographers and autobiographers food for thought. In the majority of books belonging to this sort of picturesque writing, the magnification of the most humdrum incidents in the writer's life assumes such proportions that not only does a weariness possess the reader's mind, but the really good points which might otherwise have made a favorable impression are greatly observed. No doubt, Sir Samuel Wilkes had the usual mental and physical upsets peculiar to childhood, the morbid outlook on life at the immature age of sixteen, the frustrated ambitions to be a painter, a poet, a statesman; anything, in fact, but a doctor. But he does not bore us with these details in the least, since he considers them of no moment against the progress of scientific medicine as recorded in "Guy's Hospital Reports" from 1836 until 1886. That these "Reports" make interesting reading need not be emphasized here; for the mere mention of a tabulated method of impressing the reader with what was

momentous during those years should suffice to attract his attention. The romance of medicine has been written time and again, but, though the story told is entrancing enough, it fails to record the incipient gropings of investigators and experimenters in their pursuit to shed greater light upon what was but poorly understood. These faltering steps in the evolution of scientific medicine become important mile-stones when achievement can be recorded; and nothing, we take it, can be more important for the investigator of to-day than to realize the beginnings of every evolutionary chapter. But it must not be inferred from what has been said about this exceptional book, that a bare mention of the salient features of the "Reports" constitutes its worth and value; this would be doing the author an injustice and making light of the weight of his comments. And it is just by reason of his comments that the connecting links are supplied and a continuous story is unfolded and continuity is lent to the telling of what were really the medical hall-marks during half a century.

In his three short essays contained in his book "The Medical Expert and Other Papers" (Broadway Publishing Company, New York), Dr. Louis J. Rosenberg distinctly gives evidence of the gift of writing to the point; and in these days when there is so much for us to read the absence of prolixity is certainly a virtue. But though directness should come in for its meed of praise, when it is made a cult, as it surely is in this book, it has its drawbacks, for it soon deteriorates into an artificiality that is somewhat irritating to the reader. By this we do not wish to express the idea that these essays are not well worth reading, but rather our regret that such important subjects as the medical expert, professional secrecy, and the metabolism of morality should not have been more fully treated. Pithy sentences are very well when judiciously sprinkled throughout the text, no matter how weighty the subject, but when they are thrust upon us on every page the serious thought of the author is sadly crippled inasmuch as the constant holding of oneself in check plays havoc with the sort of discursiveness without which no writing is as effective as it should be. Despite what we conceive to be the defects of this slender volume, the several points brought out by the author are very good, indeed. Especially is this true with respect to the first essay, "The Medical Expert," in which the author dwells upon the advisability of "medical experts [being] called by the Court instead of by the counsel who has an interest in making the expert testimony aid his own side of the case."

ORIGINAL ARTICLES.

ACUTE POLIOMYELITIS: REMARKS ON THE DIAGNOSIS
IN THE LIGHT OF RECENT STUDIES.

By D'ORSAY HECHT, M. D., of Chicago,
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Medical School.

Since the appearance of Ivar Wickham's monograph in 1905, on "The Pathologic Anatomy of Poliomyelitis," an admirable analysis of nine acute cases coming to autopsy in from three days to eight weeks after onset of symptoms, contributions to the study of this disease have been numerous, varied, and of incalculable importance. To intimate, however, that prior to this recent date poliomyelitis had been regarded with indifference or inexactness would be a subversion of the facts. For surely von Heine, as early as 1840, separated out the spinal from the cerebral form of infantile paralysis, and Medin* enriched our clinical data by his trenchant observations of the Stockholm epidemic in 1887. Next, the attention of such workers as Charcot, Goldscheider, Siemerling, Redlich, and Schultze was focused upon questions of pathogenesis and pathology, but the *close* scientific study of epidemics occurring in more or less rapid succession since 1902 is in far greater measure responsible for our revaluation of the clinical picture of acute poliomyelitis aided most materially by the accession of new and incontrovertible facts from the laboratories of research.

(From Wickman in "Handbuch der Neurologie" (Lewandowsky):—

Author.	Epidemic.	0-3 years.	3-6 years.	6-9 years.	9-12 years.	12-15 years.	15+ years.	Total.
Medin.....	Stockholm, 1887-1895.....	50	13	1	..	..	1	65
Wickman.....	Stockholm, 1899.....	34	12	1	1	..	5	53
Wickman.....	Goeteberg, 1903.....	11	5	2	..	..	2	20
Wickman.....	Sweden, 1905.....	183	214	179	123	106	220	1025
Collective					{			
Report.....	New York, 1907.....	463	197	40	21		8	729
Emerson.....	Massachusetts, 1908.....	29	13	10	3	5	9	69
Zappert.....	N. Austria, 1908.....	151	59	21	9	5	7	252
Lindner u.								
Mally.....	O. Austria, 1908.....	37	19	15	13	7	5	96
Fuertratt....	Austria and Steirmark,							
	1909.	25	135	85	41	21	43	450
Total.....								2759

*To perpetuate the memory of the service rendered by these two pioneer investigators, Wickman's endeavor to rename acute poliomyelitis the Heine-von Medin's disease is indeed commendable, but will, I fear, fail of universal adoption.

The epidemics of Hessen Nassau, Germany, and our own Minnesota and Iowa epidemics will bring the total down to date.

Indeed, I think it not amiss to add that medical chroniclers and textbook writers will do well soon to restate a large part of the matter descriptive of acute poliomyelitis. Already animal experimentation at the hands of Flexner and Lewis, Landsteiner and Levaditi, Roemer, Mueller, Straus, and others has prepared the way for our better understanding of the spontaneous disease in man, to wit: its communicability, the mode of infection, the nature of the virus, and its specificity for the central nervous system. Much is to be hoped for from the extension of this laboratory inquiry to problems touching on immunity, prophylaxis and in the last analysis control by specific treatment. Questions of scientific attainment and progress aside, this paper will cardinally concern itself with the clinical conception of the disease, which, thanks to the students in the field of epidemiology, has been very considerably broadened; in fact, so much so that clinicians seem to be touching hands with the research worker in erecting the hypothesis that after all poliomyelitis may properly prove to be but a generic term to designate a variety of more or less closely allied symptom-complexes arising from lesions of the cerebrospinal axis that have their origin in specific, yet distinguishable, microorganisms. As concerns the distinction between an epidemic and sporadic form, if criteria based on clinical and epidemiologic study suffice, they are in their nature and manifestations identical. In this paper reference to the one will unqualifiedly apply to the other.

If we revert to the older clinical writings, we come upon a description of poliomyelitis setting forth the well-known classic form, with its acute onset, flaccid leg paralysis, subsequent atrophy and terminal contractures. Occasionally we meet with more pointed comment than this. Recently acquired facts, however, should make obvious to the practicing physician the need of knowing more of clinical poliomyelitis than that it is a disease limited to the anterior horns, affecting only young children and characterized in the main by fever and a painless kind of paralysis. Indeed, many more considerations worthy of note qualify the general disease picture than this. To know that the paralysis singles out certain muscles or groups of muscles, that it is a flaccid paralysis, frankly asymmetrical in its distribution is not unimportant. Only in the severest cases is the entire limb withered and destroyed. It is well to remember that the affected muscles alone undergo atrophy; that the corresponding tendon reflexes are reduced or abolished, and that in the affected muscle and nerve supply the response to a faradic current is reduced or altogether lost. Moreover, in a general way, it is worth noting that every case is not ushered in with a stormy onset; on the contrary, that the invasion may be so mild and afebrile that the subsequent weakness or paralysis may be the very first clue to the presence of the disease. Finally, that paralyzes affecting, for instance, the shoulder

girdle, are likely to occur in poliomyelitis, though less common than the leg and arm varieties. When these facts become more thoroughly appreciated, a correct early diagnosis will more often obtain. But this is not all.

Keeping abreast of advances, it has remained for Wickman (in emulation of Medin), Krause and Mueller to give us a new *grouping* of disease forms, based on predominant symptoms or such as stand in focal relation to anatomic levels in the brain and cord. The position of the leg type, with its lesion limited to the spinal gray of the cord, is not disturbed; it remains in the centre, a nucleus, as it were, around which are fashioned other types not as prominent, perhaps, but none the less important. Wickman's arrangement of the classical form of poliomyelitis are as follows:

- I. The spinal poliomyelitic type.
- II. The type of ascending or descending paralysis simulating Landry's paralysis.
- III. The bulbar or pontine type.
- IV. The encephalitic type.
- V. The ataxic type.
- VI. The polyneuritic type.
- VII. The meningeal type.
- VIII. Abortive types.

In so grouping the cases, there is no intent to confuse or becloud the practitioner. On the contrary, the mere fact of singling out this or that syndrome for its conspicuousness and exclusiveness, and giving it a characterization of its own should serve to bring the entire symptomatology into nearer and clearer view. Moreover, physicians who might hesitate in the diagnosis of atypical cases will perhaps be made to feel more certain of their premises when they bear this arrangement in mind.

I recall several cases seen within the past years so illustrative of an unusual onset and atypic course that they seem worthy of mention in slight detail.

Miss D. B., aged twelve; was seen in consultation with my colleague, Dr. Julius Hess, November 8th, 1910, and observed daily thereafter for many weeks at the Michael Reese Hospital, Chicago. A rather mild insidious onset for the first few days, characterized by some fever, malaise and restlessness, and, on the fourth day, by almost incessant vomiting. A servant in the same household, and a younger sister fell ill at the same time, and in a similar manner, but their symptoms rapidly disappeared by the fourth day, whereas our patient grew worse. Up to this time the acute gastro-intestinal invasion affecting three individuals simultaneously, suggested something of an innocent ptomaine-like disturbance. Our patient now developed a temperature of 101° to 102° F., became very restless, sleepless, excitable and had occasional vomiting spells. On the eighth day, when I first saw her, she, for the first time, showed difficulty in swallowing, and the voice sounds were husky and of nasal quality. The head lay in a limp position to one side, and when turned or raised voluntarily brought on a fit of coughing or choking. Attempts to take food or water

resulted in paroxysms of strangulation most distressing to witness. The face was flushed, the eyes bright, the pupils well dilated, reacting normally to light and accommodation, and the fundi were negative. Respirations were notably rapid and shallow. Examination revealed a slight drooping of the right corner of the mouth, complete paralysis of the soft palate on the right side, and a relaxed uvula. Other cranial nerves were apparently intact. This clinical picture remained unchanged for another day or two. The extremities were freely moved. Bowels and bladder were continent. Within a day or two pain appeared at the nape of the neck, in the small of the back and in the legs. The head could not be lifted, the arms and legs remained free. After another twenty-four hours the picture changed in that the legs were involved in a rapidly descending paralysis, affecting all parts symmetrically except the toes, which never quite lost all their ability to move. The back muscles as well as intercostals were impaired. The abdominal recti were spared. The arms from beginning to end were unaffected. Sphincter control was for a time lost, then regained. The facial and glosso-pharyngeal paralysis so predominant at first began to improve some late in the second week. Nasal tube feeding was discontinued after the eleventh day, but solid food was taken with great caution for many weeks later, and it required several months before normal swallowing took place. As the bulbar symptoms receded, the spinal ones, showing only in the legs, deepened. The tendon reflexes in the arms were present; the abdominal skin reflexes also faintly so; the knee-jerks and Achilles were absent (and have remained so); the plantars were present. The spinal syndrome was for many weeks characterized by intense agonizing pains in the lumbosacral region, radiating into the legs; indeed, so severe as to require constant changing of body position, hot flannels and morphine. Objective sensory disturbances there were none. The temperature was for the most part of low grade, ranging from 98° to 100°, never exceeding 101.2° F. Respirations, irrespective of the temperature curve, varied mostly from 36 to 48, never falling below 28. The reaction to degeneration taken on the twelfth day was complete for some muscles, incomplete for others. The urine showed some casts and desquamative renal elements. The blood showed 4,200,000 reds; whites, 16,600, and hemoglobin of 90. Spinal puncture revealed a perfectly clear fluid, 6 to 10 lymphocytes to a field, no other cellular elements. Cultures from the spinal fluid were negative. Tubercle bacilli not found. Noguchi negative. Eleven months after date of onset, the residuum of paralysis is now confined entirely to the limbs, which have undergone considerable selective atrophy, the voice retains the least degree of nasal quality, the functional ability of the legs is restricted to only momentary support when unaided in standing.

This case probably does not fall into the rubric of those pure bulbar or pontine forms in which symptoms of a focal character for this region alone occur. It ranges itself more with the commoner forms in which the spinal and cranial nerve components occur together, but with the one or other predominant. Isolated bulbar and pontine forms, however, do occur, and in this connection I beg leave to roughly sketch the clinical findings in a case seen only a few days ago, in the pediatric service at the Michael Reese Hospital, also with Dr. Julius Hess.

Patient, R. G., aged three years, was taken ill four days before admission to the hospital, with three vomiting spells occurring at night, some frontal headache, rather persistent, and the following morning slight temperature, with irritability and later apathy. The family history good, although one sister is

known to have tubercular hip disease. A child, living only four doors removed, is known to have come down with paralysis at the same time that our patient fell ill. One day prior to admission the parents noticed an internal squint of the left eye. On admission the temperature was 101.6° F., pulse 120; respirations 32. This curve dropped to normal after the first day and has remained so. Physical examination revealed on the part of the cranial nerves a distinct left external rectus palsy; pupils and fundi were negative; well-defined left facial palsy of peripheral type; deviation of the tongue to the left (not apparent, but real). On the first day there was definite rigidity of the neck muscles, so that attempts to lift the head caused the shoulders to rise. Palpation of the neck muscles was painful. Anticipating some ear involvement because of a slight complaint of earache, paracentesis was done, with negative result. The mastoid was not tender. After the first day, the sense of rigidity of the neck muscles disappeared and, judging from the position of the head and the readiness with which it falls backward, the posterior neck muscles now show definite weakness. The child's gait was closely observed. There was no gross paralysis in any one muscle or group of muscles, but conspicuous were the queer, infirm, uncertain ataxic steps of the child. Although an unusually intelligent child for her age, she could not assist enough for the determination of slight errors in motility or strength. The reflexes in the upper extremity were present; abdominal skin reflexes present; painstaking effort failed to elicit the knee jerks; the Babinski was absent; the plantars were present. The urine was normal. The blood count showed only an increase in the white cells 14,400. The Pirquet negative; the spinal fluid which was not under tension was perfectly clear and sterile. The Ross Jones and Noguchi tests were negative; very few lymphocytes were noted. On the whole, the child's condition was rapidly improving.

Conceding the possibility of a basilar or pontine lesion of different pathology I feel very certain of the poliomyelitic nature of the infection in this case, on the strength of the pontine symptoms, involvement of the sixth, seventh and twelfth nerves, the paretic neck muscles, the ataxic gait, together with the lost knee jerks. The ataxia, which in this case bore the closest resemblance to a cerebellar ataxia, has already received mention by Wickman, Zappert, and Spieler. Wickman cites an instance of oculoplegia, left facial and right hypoglossal paralysis, with ataxia of a cerebellar type. Mueller has reported a similar case, having much in common with ours, presenting facial paralysis, notable hypotonia and absence of the knee jerk on one side. Of the cranial nerves, the seventh is most frequently affected, involving both its upper and lower branches. It is usually unilateral and shows a tendency to improve, so that the ultimate disability may be very slight indeed. Wickman calls attention to the association of hypoglossus palsy in these bulbar and pontine types, where the facial is affected, and remarks also that on the part of the ocular nerves the third (oculomotor), and the sixth (abducens) are not infrequently involved. In some instances complete ophthalmoplegia has been observed; in others an isolated ptosis occurs. Optic atrophy was noted by Tedeschi in a case of poliomyelitis that had run its course, and Medin, Wickman and others have seen trigeminal disturbance with paralysis of the mandibular muscles.

I have sought to show by these brief case histories and references to the literature that cranial nerve lesions, with or without spinal involvement, characterize many of the atypical forms of poliomyelitis. I feel that the physician should bear these points in mind, and to this end Wickman's tabulation is subjoined as further evidence of their frequency-incidence:

EPIDEMIC OF 1905. (Wickman.)

Cranial +	Spinal Lesion.	Cranial Alone.
VII	12	14
XII	9	9
Eyes	5	3
VI	4	2
III	4	2
IX-XI	5	4
V	2	..
II	1	..
	<hr/> 42	<hr/> 34

1. Mueller, in 100 cases, saw 13 facial and 3 external rectus palsies.
2. Zappert, in 290 cases, 25 cranial nerve lesions.
3. New York epidemic report. Among the 752 cases, face affected in 27, eyelids in 18, strabismus in 26, deglutition in 18, speech anomalies in 28.

Meningeal Types.—An atypical form of poliomyelitis, which chiefly from its mode of onset, gives rise to confusion and leads to hesitancy in rendering a diagnosis is the meningeal form. Within the past five years I have seen some five instructive instances of this sort. One such case was seen in the neuriatric service at Wesley Hospital, occurring in an electrical engineer, aged 21. Three were seen among children in private practice, whose respective ages were one and one-half, three and four years, and the fifth occurred in an infant less than one year old, seen with my colleague, Dr. I. A. Abt, in his pediatric service in the Michael Reese Hospital. Knowing from a study of the pathology that the brain cortex and meninges are not always exempt from the vascular irritation, cellular infiltration and edema characteristic of poliomyelitis, occurrence of meningeal symptoms is in a fair per centage of the cases to be anticipated. In fact, the disease is not infrequently ushered in under the guise of an acute meningitis more closely simulating the cerebro-spinal form than any other, with intense headache, photophobia, vomiting, neck rigidity, posterior neck and head pains, opisthotonos, convulsions and stupor. Following this stormy onset, the paralytic symptoms generally appear. Some observers, however, are confident that in not a few instances the meningeal syndrome clears up without paralysis superadded, and then again death may set in early, before the paralysis has had a chance to appear. In respect to this particular form, the New York epidemic offers striking data which, by the collective investigation committee, were classified with the nervous symptoms so-called. Headache occurred in 162 cases; delirium in 62; convulsions in 51; twitchings in 8; apathy in 294; stupor in 71; neck rigidity a marked factor in 121 cases,

and photophobia in 26. The comment is that "these might well be placed in Wickman's category of the meningeal type."

The young engineer referred to is a classic case in point. He presented for the first four days a temperature of 103° F.; agonizing headache; photophobia; delirium; marked neck rigidity; severe back pains; opisthotonos; generalized muscular twitching; bilateral strong Kernig; vomiting, and a quadriplegia associated with marked widespread dysaesthesia and some spasticity. The withdrawal of spinal fluid on the third day revealed a perfectly clear content, which, when centrifuged, showed numerous lymphocytes. This operation reduced much of the patient's restlessness and headache. On the sixth day the paralysis came to the fore, at first involving all four extremities, and gradually receding to the point of a permanent, severely disabling triplegia. Here the negative qualities of the spinal fluid were of the greatest value in arriving at the differential diagnosis of true meningococcic origin.

Abortive Types.—The designation "abortive" applies to those cases of poliomyelitis that appear concurrently with the more classic paralytic types, but manifest practically only the symptoms of the general infection; in other words, a case characterized by invasion symptoms without paralysis occurring at a time when a neighborhood or epidemic infection with paralysis is known to exist, would constitute an example of the abortive form of the disease. I believe this form is seldom apprehended in sporadic poliomyelitis, but I rather suspect that the younger sister and domestic living in the house of our first patient, sickening at the same time and in the same way, aborted their attacks of poliomyelitis in or through their gastro-intestinal tracts. The history of epidemics is replete with such instances in which nausea, vomiting and diarrhea appear, and suggest a violent gastro-enteric catarrh. Wickman, here, as everywhere in his clinical revision, seeks to clarify these types by assuming the following scheme:—

1. Cases running the course of a general infection.
2. Cases with symptoms of meningeal irritation resembling "meningismus."
3. Cases in which the element of hyperesthesia and pain is marked (pseudo-influenzal).
4. Cases with gastro-intestinal disturbance.

These sub-varieties fuse with one another, but it is well, on the whole, to recognize their larval character. The practitioner who will instinctively call these abortive types to mind when confronted with a patient will find the problem less difficult.

The polyneuritic form distinguishes itself by reason of the appearance of greater pain and tenderness in the muscles and nerve trunks, pain in excess of the generalized dysaesthesia which may be present. An analysis of the early stages will show that some degree of pain and general hypersensitiveness, usually of short duration, is a not uncommon finding

in poliomyelitis. There is no post-mortem evidence to show that neuritic changes take place in the large nerve trunks in this particular type. The pain element, then, taken at its proper value, is polyneuritic-like and not actually neuritic in the sense of showing neuritic pathology.

Because of its value in the differential diagnosis, especially as it relates to cerebro-spinal meningitis, a word concerning the spinal fluid is indicated. In the majority of cases during the initial stage, and even for weeks after onset, the fluid will be found increased, released under pressure, perfectly clear and absolutely sterile. As to the cell content in the centrifuged specimen, authorities differ somewhat. Müeller found only a few lymphocytes and confirmed Krause's findings of the previous year's epidemic in Germany. Wollstein, from an examination of twenty cases, developed from the second day to eight weeks among children from five months to eight years of age, found the fluid always colorless and clear, and in most of the centrifuged specimens stained with methylene blue and by Gram an entire absence of cellular elements. On the other hand, we have some reports from some French sources (Brissaud and Londe, Triboulet and Lippman), Starr and others that the lymphocytes are increased. The diplococci occasionally described are probably accidental findings, due to error in technic or mixed infection. This negative character of the fluid is in such marked contrast to the cerebro-spinal fluid of meningitis of whatsoever origin, but chiefly the epidemic cerebro-spinal form, as to be of distinct value in differentiating these diseases in their acute stage, for here we find turbidity, leucocytosis and the meningococcus intracellularis. In differentiating from the tubercular meningitis we may, by reason of the clearness of fluid and lymphocytosis in both, encounter greater difficulty, but the tubercle bacillus is with proper staining and patient search now being found in nearly all cases.

Without doubt the differential diagnosis between multiple neuritis and poliomyelitis, when both are well established, may give rise to the greatest amount of error; in fact, in some cases the positive diagnosis must be deferred until the period of convalescence and cure comes to our assistance. This applies with particular force to the post-infectious neuritides. I recall R. B., a female patient, eight years old, seen in the pediatric service of the Michael Reese Hospital, at the request of my colleague, Dr. Abt, in whom the question of a post-diphtheritic neuritis or poliomyelitis remained speculative for many weeks, almost until she was finally dismissed from the ward as cured. It should be remembered that an angina, bulbar and spinal symptoms occur in both diseases.

To dwell upon the syphilitic affections of the cord, syringomyelia or progressive muscular atrophy in their differential relations to acute poliomyelitis, would take me quite beyond the reasonable latitude to be observed in a paper of this kind.

THE TREATMENT OF GRIP.

By FRANK S. MEARA, Ph. D., M. D., of New York,
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Of grip or influenza there are two statements to be made which I think no one will attempt to gainsay; first, that of all the acute infectious diseases with which we have to deal, it is the most common; secondly, that no other acute infectious disease is so protean in its manifestations as this ubiquitous malady.

Much confusion has arisen in the use of these two terms, grip and influenza. By most men they are used synonymously, but many insist that influenza is applicable only to that infection caused by the organism of Pfeiffer, the influenza bacillus. If their contention is sustained, then we see this disease relatively infrequently, and what we consider as such and treat as such should receive another appellation and "grip" might be so used. Now, we do have a common clinical entity, characterized by suddenness of onset, aching pains in the back and limbs, headache, high fever, prostration, some catarrhal symptoms in the respiratory tract and followed by weakness and depression out of proportion to the other symptoms and which may be accompanied or followed by serious involvement of important organs or systems. These attacks are accompanied by the presence of one or the other or of a combination of several organisms, in such numbers and so distributed as to warrant the supposition that they stand in causal relationship to the disease; and among these organisms is the bacillus of Pfeiffer, but in by no means the majority of the cases. Beside this organism may be found the pneumococcus, the streptococcus pyogenes, the streptococcus mucosus capsulatus or the micrococcus catarrhalis. In no way does the attack, with reference to the onset, characteristic pains and aches, prostration, after effects or complications, differ in one case or another sufficiently to guarantee a diagnosis of the organism concerned. Moreover, the influenza bacillus has been found in other conditions that do not present the clinical picture of grip. Whether we are dealing with one or the other bacterium can be determined only by culture. At the present we have no specific treatment for influenza and find ourselves limited to the effort to afford relief, to prevent complications, or treat them if they do occur.

All that follows, then, is applicable to the clinical grip and if I use both terms, it will be understood that they are used synonymously.

An attack of grip of average severity compels a patient to seek rest and seek it in bed; but in lesser attacks, often termed common colds—

and, indeed, the border line between the common cold and grip is by no means clear cut—the patient may insist on keeping about and endeavor to attend to his business. That every patient with a cold in the head should go to bed is absurd, but if the so-called cold is accompanied by signs of intoxication, aches, pains, prostration and temperature out of proportion to the local manifestations, then the diagnosis is warranted, as at least connoting a more serious infection, of which the complications or sequelæ are to be feared, and the patient should be ordered to bed until his temperature is normal, his protests being met by a presentation of the facts and possibilities in the case.

The typical attack of influenza is usually abrupt, sometimes like a bolt out of the blue, ushered in with chilly sensations and decided malaise.

The patient should be put to bed, a hot water bag put at his feet, a drink of hot tea, hot water and a teaspoonful or two of whiskey or a hot lemonade with or without whiskey given, and blankets added to the covering until the febrile reaction begins. With the fever comes the headache, the pains in the back, and bones that makes the patient feel as if he had been mauled and bruised and the discomforts of the elevated temperature. The head is often confused and a mild delirium may occur.

A cool sponge bath or one with tepid water or one containing a little alcohol applied to the whole body or to the face, arms and legs gives some relief. Cold cloths are placed on the forehead to relieve the headache or an ice-bag may be used. Bits of cracked ice are sucked or small amounts of cold water taken frequently.

A saline cathartic should be given, in the shape of a Seidlitz powder, a full glass of liquor magnesii citratis, or a half ounce of either Rochelle salts or Epsom salts in a half to three-fourths of a glass of water.

Diet.—At the onset of the attack food should not be offered; and the anorexia should be taken as an indication that the body is not ready to entertain it. After the first day, however, fluids in the shape of milk or gruels may be given and later soups, eggs, and cereals.

When the temperature has subsided the diet should be made liberal, for the loss of flesh may have been considerable, and it must be appreciated that the 2,500 or more calories that the body will have, even in the weakened state, must come from somewhere, out of its own tissue, if not provided for in its food.

In no other acute infectious disorder do the coal tars work so happily to the comfort of the patient, as in this.

The sudden fever, the severe headache and the racking pains of body and limbs all indicate these antipyretics and analgesics.

There is no class of drugs more abused or misused than the **antipyretics**. In a certain number of conditions when properly used they are invaluable, but like most drugs of real worth they are rife with danger when administered carelessly or in ignorance.

The three best known antipyretics are acetanilide, sometimes called antifebrin, antipyrin, and phenacetin.

This is also the order of their potency and of their toxicity. From these three have come numerous derivatives, made by introducing a radicle into their structure or substituting one radicle for another, in the effort to enhance their pharmacological value and at the same time diminish their dangers. With them have been combined other drugs of a different pharmacological action in the effort to get the two in one preparation, as for example when antipyrin and chloral are combined to form hypnal to get a substance which will produce sleep in the presence of pain, or salicylic acid and antipyrin are combined to form salipyrin to enhance the value of salicylic acid in the relief of pain in rheumatism.

So quickly and abundantly have these preparations come, so ardently have they been welcomed and praised, so rapidly have they been abandoned that it is difficult to set an appreciation on more than a few of the group.

Personally, I rarely use for any purpose any other than the three first mentioned.

In grip any one may be used; better results are obtained from small doses frequently given than from large doses. Which of these is the better I cannot say, but one will find oneself giving preference to one or the other more and more and that will represent the fact that the workman is becoming used to his tool.

In grip my preference is for the most toxic and potent of these three—namely, acetanilide, but I give it in small quantities at frequent intervals.

The results have been so good, year in year out, that I have felt no inclination to experiment with the others.

I have no doubt that I should have had just as good reports to offer from one of the other preparations had I accustomed myself to their usage. My favorite prescription runs thus:—

R Acetanilidi.	1.50
Sodii bicarbonatis.	1.00
Caffeinæ citratæ. . . . .	.50
M. et Divide in capsulas no. xv.	

Each of these capsules, then, contains $1\frac{1}{2}$ grain of acetanilide, which is a very small dose, one grain of bicarbonate of soda, which possibly lessens the slight irritant effect of acetanilide on the gastric or mucous membrane; at any rate it is given on that supposition, and $\frac{1}{2}$ grain of citrated caffeine, for two reasons: First, as a prophylactic, to counteract the slight depressing effect that is induced in some susceptible individuals by acetanilide, and secondly, because it is itself an analgesic.

The fact that caffeine is a circulatory stimulant naturally led to the supposition that its presence in a prescription containing acetanilide or other antipyretic afforded an antidote in some measure to the toxic effects of the latter. Physicians have been influenced by this idea to permit patients to take doses of these antipyretics, when so "sheltered," of a size they would fear to administer, if given alone.

Worth Hale* experimenting on the toxicity of acetanilide when administered alone, when given with caffeine, with sodium bicarbonate or when all three are combined, obtained results that make us pause in the use of the larger doses of these drugs.

In animals he could show that the addition of caffeine to acetanilide caused death by the latter more quickly or in smaller dose, while bicarbonate lessened the toxicity of acetanilide.

In white mice he found acetanilide and sodium bicarbonate the least poisonous, acetanilide alone next, acetanilide, caffeine, and sodium bicarbonate still more, and acetanilide and caffeine most.

I give this capsule, if the attack is severe, every hour for four doses, then every two hours, so that, the patient gets only 10 grains in ten hours, a dose set down in some of the books as a single dose, though I think it rather large.

In the vast majority of cases the effects are very manifest in terms of relief from discomfort within a very few doses and this is followed soon by a fall in temperature, which is usually marked by, if not before, the next morning.

If such relief occurs, one may give the capsule the next day at three-hour intervals and the next at four-hour intervals. In the lighter attacks the drug need not be continued beyond the next day. If the attack is prolonged or complications ensue, the drug should not be too long continued. Such continued usage will do harm. Its benefit is confined to the early, sthenic period of the infection.

This is very important to remember, for one must not entertain the idea for a moment that these drugs cure the disease or have any direct action on the invading organism. They simply make the patient more comfortable and in better condition to meet the infection.

The effects of these drugs on fever is rather interesting, and, indeed, we need once in a while to orientate ourselves with reference to our ideas of fever.

Fever, after all, is a state or condition in which the bodily processes operate at a higher bodily temperature. This state may be variously brought about; but here, as in most of the fevers in which we are interested, it is brought about by the action of the toxins of the infecting organisms on the heat regulating mechanism. We often speak of the patient as "burning up with fever" and entertain the idea that his combustion, his oxidation processes, are greatly increased.

This is not the case. The actual increase in oxidation is slight. While varying in different diseases and individuals, the amount of increase will not average over 25 per cent. of the heat production at rest and as compared with the output of heat during active exercise is a mere bagatelle.

A man at rest with food eliminated 812 grams of CO₂ in the day and

*Worth Hale: The Effects of Caffeine and Sodium Bicarbonate Upon the Toxicity of Acetanilide. *The Journal of Pharmacology and Experimental Therapeutics*, Vol. I, No. 2.

a man at severe work 3,073 grams of CO_2 : over three and a half times as much, and yet all the heat this oxidation represents induced no fever.

Nor, on the other hand, is the output of heat greatly interfered with to account for fever.

What seems actually to occur is that the heat regulation has been set at a higher level, runs on a different plane.

But on this plane the same mechanism for retaining heat when the body temperature is lowered and the same mechanism for getting rid of heat when the body temperature is raised is called into action as when running at a normal level. At this new level, however, the mechanism is not so nicely adjusted and greater variations follow from lesser influences exerted on it; hence, the marked effect of antipyretics in fever that we do not see follow in conditions of health.

This regulating mechanism is vested in special nerve-tissue somewhere at the base of the cerebrum, in the neighborhood of the corpus striatum.

How antipyretics act on this centre we do not know, but what it does is to knock the regulation down to a lower level, on which the mechanisms of defence against an increase or decrease of heat are called into action, just as on the higher plane before the administration of the drug and as on the lower plane in health.

But as the influence of the drug wears off or the influence of the toxin reasserts itself, the heat regulation is pitched higher and higher to its old level.

We know that the fever is not the disease, only a symptom.

We know that temperature above 102°F . is accompanied by increased proteid destruction, which it may or may not be desirable to interfere with.

We know that the temperature may become so high as to threaten life itself and then certainly should be combated; but we are coming more and more to scrutinize symptoms so as to detect in them expressions of compensatory processes.

That fever was a favorable state in the presence of the toxemia of infection was an idea long entertained, more lately fell into disrepute and, now, most recently, is being advocated by thoughtful men and careful observers.

What our antipyretics do of value in grip is probably less attributable to the lowering of temperature than to the relief of aches, pains, cerebral excitement, all of which mean wear and tear, and so, as I have said, make the patient better able to cope with the infection.

Acetanilide is chemically a very simple body.

It is derived from anilin, $\text{C}_6\text{H}_5\text{NH}_2$. It was discovered that anilin had the property of lowering temperature but that it was at the same time very toxic, inducing collapse.

I have shown how the toxicity of a drug may be altered by the introduction of simple radicles into its constitution without altering its effi-

ciency from a therapeutic standpoint, when discussing the salicylates in the treatment of rheumatism.*

Now the introduction of an alkyl radicle to replace an H of an amido group retards the action of the base, so when the acetic acid radicle $\text{CH}_3\text{CO}-$ takes the place of an H in the amido group of anilin $\text{C}_6\text{H}_5\text{NH}(\text{CH}_3\text{CO})$, it retards the action of the active portion of the molecule which is anilin, set free, and it does that by offering resistance to the oxidative processes of the organism, by which the setting free of the anilin occurs. The result is a partial detoxication of the anilin. When the anilin is set free the body further oxidizes it to a paramidophenol, which is anilin with a OH radical taking the place of the H in the ring opposite the NH_2 group, the para position. This oxidation further detoxicates the substance and when finally it becomes paired with sulphuric acid or glycuronic acid the detoxication is complete and the substance is so eliminated in the urine.

$\begin{array}{c} \text{CNH}_2 \\ \text{HC}-\text{CH} \\ \text{HC}-\text{CH} \\ \text{C} \\ \text{H} \end{array}$	$\begin{array}{c} \text{H} \\ \text{CNCH}_3\text{CO} \\ \text{HC}-\text{CH} \\ \text{HC}-\text{CH} \\ \text{C} \\ \text{H} \end{array}$	$\begin{array}{c} \text{CNH}_2 \\ \text{HC}-\text{CH} \\ \text{HC}-\text{CH} \\ \text{C} \\ \text{OH} \end{array}$	$\begin{array}{c} \text{CNCH}_3\text{CO} \\ \text{HC}-\text{CH} \\ \text{HC}-\text{CH} \\ \text{C} \\ \text{OC}_2\text{H}_5 \end{array}$
1	2	3	4

1. Aniline.

2. Acetanilide, in which one of the H molecules in the amido group has been replaced by the alkyl radicle CH_3CO .

3. Paramidophenol, in which an H molecule in the opposite group (para-position) has been replaced by an OH radicle.

4. Phenacetin, in which the H molecule of the paraposition of acetanilide has been replaced by an oxyethyl group O_2CH_3 .

When the chemists appreciated the means by which Nature detoxicated acetanilide, they seized on the paramidophenol, which while less poisonous than anilin was still capable of inducing symptoms in kind and of still changing hemoglobin into methaemoglobin like the mother substance and rendered it less toxic by introducing an ethyl radicle into the OH in the para position and thus produced a body which permitted the paramidophenol to be set free from its molecule still more slowly and therefore was less toxic. The characteristic action, being all the time due to the paramidophenol.

This body is known as phenacetin $\text{C}_{10}\text{H}_{13}\text{NO}_2$. One sees then that phenacetin is acetanilide in which the H. of the para position is replaced by an oxyethyl group.

So it is with all this group of drugs. They all owe their activity to the setting free of the paramidophenol, but their efficiency and safety to a nicety of balance between "fast enough" to have action on the tissue and "slow enough" not to poison the tissue.

*See Treatment of Rheumatic Fever, *American Journal of Medical Sciences*, March, 1910.

So in administering these drugs, the amounts and frequencies with which they are administered make a great difference in the ultimate results.

If one entertains prejudices against acetanilide, one may use the less toxic phenacetin in its place in such a prescription as I have just given in doses of gr. ii to ii ss; or it may be used alone, as the use of the other constituents in this case obtain to a less degree.

If these antipyretics be used injudiciously in large amounts or in cases of idiosyncrasy for the drug, certain untoward results may ensue. They are the onset of (1) collapse, (2) cyanosis, (3) a group of lesser disorders.

(1) The collapse may come on abruptly or after certain premonitory symptoms. It is more likely to ensue with acetanilide than with the others and with antipyrin more commonly than with phenacetin.

The patient is pale, the skin cold and clammy, the pulse rapid, small and sometimes irregular, the pupils slightly dilated and the patient faint, apathetic or confused. He may remain, however, perfectly conscious. The treatment like that of collapse from any cause is, in brief, application of heat and stimulation.

(2) Cyanosis. A marked degree of cyanosis is a characteristic symptom of poisoning by these drugs and is most marked after acetanilide, less after phenacetin and least after antipyrin.

It occurs early relative to the more dangerous symptoms and it is not an uncommon experience to see patients who use this class of drugs freely for headache and neuralgias, especially in the shape of some of the proprietary remedies, with blue lips and finger nails, though not conscious of further distress.

The cyanosis is not an indication of respiratory or circulatory embarrassment, but is due to changes in the coloring matter of the blood, to the formation of methemoglobin. Of course, if the dose is sufficiently large, dyspnea and cardiac failure ensue.

(3) Among the lesser disorders that occasionally appear are eruptions, erythemata, urticaria, or even angioneurotic edema. There may be burning of throat or mouth, nausea or vomiting, excessive perspiration, more rarely apathy or mental confusion or disturbances of hearing.

The eruptions may give rise to a diagnosis of scarlet fever or measles. In the former case the sudden onset and other symptoms may easily be diagnosed as grip and the coal tars given in treatment.

With the appearance of the eruption one might attribute it to the coal tars. Take no chances in the matter. Treat it as scarlet fever until proven to the contrary. When one has to differentiate between two conditions, one of which is common, and the other unusual, one should always give preference to the former. One should not let the possibility of a shrewd diagnosis run away with sober sense.

By enumerating all the things that may occur after the use of the coal

tars, I do not wish it inferred that they are common. They are really safe drugs to use, when used properly. More can not be said of any drug.

As has been said, there are no end of drugs advised for grip. When there is no specific for a disease, one is impressed with this or that line of treatment in proportion to his knowledge of the man who advocates it and the terms in which he estimates it.

Burney Yeo, whose position as a clinician needs no comment, in his "Manual of Medical Treatment," is so thoroughly convinced from his personal experience of the efficacy of quinine after two or three days preliminary treatment with such measures as I have described, his own preference being salicin, that I cannot refrain from mentioning it though I have had no personal experience.

He uses it in doses of gr. i to iii every three or four hours and prefers to give it in solution in citric acid; lemon juice would answer.

Certainly the doses are neither large nor frequent; the effect of quinine upon temperature and pain and to lessen metabolism and its freedom from bad effects are well known and would lead to no hesitation in its usage.

Some involvement of the upper air passages or of the trachea is almost constant. In most cases it is slight and relief is afforded by local measures or by inhalations. Tracheitis is not uncommon, causing a nagging cough, and a feeling of rawness or discomfort under the sternum.

I am fond of a simple remedy that works admirably in many instances. A mixture of equal parts of spirits of turpentine, spirits of camphor and olive oil is made, a bit of flannel to cover the anterior chest is saturated with it and laid upon the chest, pinned into the night shirt and left on for the night. This may be made in the house. Order a tablespoonful of each, stir with the spoon and saturate the cloth. The patients inhale the fumes all night and marked relief to the feeling of soreness and tightness is afforded, the cough ameliorated and expectoration facilitated. Camphorated oil may be used in the same way.

Inhalations of compound tincture of benzoin, or of the oil of pine, a teaspoonful or two on a pitcher of hot water, or a teaspoonful to a pint in an inhaler, or a few drops of the saturated alcoholic solution of menthol on a pitcher of water will prove grateful.

If the cough is more harassing, codeine may be used in doses of gr. $\frac{1}{8}$ to $\frac{1}{4}$ every two, three or four hours, or heroin in doses of gr. $\frac{1}{10}$ to $\frac{1}{12}$ at the same intervals.

One of the most striking characteristics of this disease is the weakness and prostration of the patient after even a short course. In many, complications of a mental nature bespeak the profound effect of the poisons on the nerve centres.

Convalescence should not be hurried. Exposure after the attack has subsided, although a matter of two or three days is an invitation to relapse or complication. The danger must be explained to the patient and

the demands of his body for further rest, as dictated by his weakness, be listened to rather than his mental protests and ambitions and business urgencies.

If the patient will assume this attitude towards himself, his returning strength will give the word for further indulgence.

In the meantime the diet should be made liberal to make good the ravages of the toxins.

Simple well-cooked foods, solid or fluid are indicated. Light rubs or massage given to the sore and tired muscles, fresh air and plenty of it, in bed or chair at first and later in the walks and, if the convalescence is unduly protracted, a change of air does wonders.

Patients should not get back to work until they feel again the impulse of health.

At this juncture tonics are supposed to be indicated. I believe one should feel that the best tonics are to be found in fresh air, sunlight, good food and properly proportioned rest and exercise rather than in drugs.

If our patients however, are not content, after such measures have been honestly adopted, we may try strychnine in doses of gr. 1/40 to 1/30 three or four times a day.

Such is the treatment of a moderately severe attack of grip without complications; but it is the complications that makes grip the serious disease it is.

I have said that it is one of the most protean of diseases we have to deal with.

What organ may be implicated we do not know, but there are a certain number so frequently involved that we should never cease to keep our eyes open for the first indications of such an occurrence.

The respiratory tract in some part of its extent is almost certain to be implicated.

We have just dwelt on the lesser manifestations of it. Dependent on infection of the upper air tract is the common occurrence of otitis media.

I cannot dwell on all the phases of this important chapter of grip. What I want to emphasize is the vital importance of ever keeping it in mind.

In older patients the involvement of the ear is accompanied by pain, so that it is not likely to be overlooked, but in children and especially in younger children this does not hold true. It is the most common experience of a pediatricist to find the first evidence of an otitis in the discharge that has taken place through the ruptured drum.

In the acute infectious diseases of childhood it is good practice to examine the ears periodically and in such diseases as scarlet fever and influenza its neglect is scarcely pardonable.

Examination of the child's ear is not the easiest procedure in the world and so is commonly neglected by the general practitioner, but routine use brings its reward in facility acquired.

When treating a young child or infant for influenza, suspect the ear if there is sudden exacerbation of temperature, often very high in children, or if there is a rise of temperature after the normal has been reached, or the child becomes much sicker without obvious cause for the manifestations.

The temperature of otitis in children may be long continued and sometimes with marked excursions of temperature.

Let me intercalate here that when I see long continued temperature in children with marked daily excursions, I always think of influenza, otitis media or *Bacillus-coli* infection and of course, in a malarial district, of malaria.

The incidence of otitis seems to vary from epidemic to epidemic and its virulency too.

That mastoiditis is all too frequent a sequel, that sinus thrombosis and meningitis may be, that some of the cases are fulminating should make us appreciate the seriousness of it, and seek special advice.

If this is not at hand a paracentesis or incision is simple and should not wait on temporary measures of relief.

Another result of infection of the respiratory tract, much dreaded and constantly to be watched for is pneumonia. Influenza pneumonia has a high mortality, which differs in different epidemics.

While lobar pneumonia may occur with grip and run a regular course, the typical pneumonia is of the lobular type, bronchopneumonia.

As a rule this occurs a few days after the onset though it may be earlier.

Grip pneumonia is prone to be insidious. It occurs in scattered foci; it is often incomplete, its physical signs are very irregular, the subjective symptoms are out of all proportion to the objective.

It is frequently slow in resolution.

It is because of all these facts that the lungs should be examined daily. In two classes of patients the search should be especially assiduous; in old people and in children.

In old people the signs of bronchopneumonia are the least satisfactory. They may be absent entirely and the diagnosis be made on the degree of respiratory embarrassment and intoxication. The cough may or may not be prominent. The temperature may not be elevated.

The signs may be only those of localized bronchitis; that is, râles, or there may be only a little dullness and diminished breathing. One cannot watch the chests of old people confined to bed too closely. They are extremely susceptible to pneumonic processes, made much more so in a grip attack.

In children, too, it must be remembered that the physical signs are often slight and that the diagnosis may have to be made on the rapidity of respiration, prostration or cough.

The regularity of distribution of the lesion the incompleteness of the

consolidation and the persistency of signs may give rise to the diagnosis of tuberculosis. Such a case in a young man, with consolidation at the left apex, a fairly high temperature with a good deal of excursion, a severe cough and a prolonged course I saw diagnosed as a case of acute miliary tuberculosis to the great distress and alarm of the family, in which tuberculosis had occurred.

Again, the retardation in resolution of these patchy and incomplete consolidations may occasion the same diagnosis.

When these cases are determined, they should be treated as pneumonia arising from other causes.*

Tonsilitis, bronchitis and pleurisy are to be treated in the same manner as if arising under other conditions.

Of rhinitis I would add a word.

This is exceedingly common in influenza. It is often very distressing and accompanied by much frontal headache.

This usually means an involvement of the sinuses.

When the frontal sinuses are involved there is pain especially over the inner third of the orbital ridge and this pain is made worse by blowing the nose; when the ethmoidal sinuses are involved the pain is said to be deeper set or even occipital; when the antrum is involved there is pain in the superior maxillary, especially in the malar region and often a toothache on the affected side. Our efforts should be to endeavor to shrink the mucous membranes enough to open the ducts and passages to these sinuses to allow a drain. This may be done by spraying the mucous membrane with adrenalin 1 to 10,000 and after the drug has exerted its effect spray with an oily solution. I like one advised by Coakley—namely:—

R	Menthol.	gr. xxx
	Camphor.	gr. xx
	Eucalyptol.	m. xx
	Olei rosæ.	m. iii
	Benzoinol, q. s. ad.	oz. ii

M. et S. Use in an oil atomizer.

If the antrum is involved, the head should be turned to the sound side, hanging a little over the edge of a pillow to facilitate the discharge.

The menthol solution as so given I find at times too strong. It may be reduced x or xv grains, or the whole may be diluted with more benzoinol.

If the nasal discharge is marked, order extract of belladonna gr. $\frac{1}{8}$ or atropine gr. $\frac{1}{120}$ q. 2. h. until the discharge stops and then give at intervals of 4 to 6 hours to control it.

When giving belladonna so frequently, one should not forget that many people have an idiosyncrasy for it and should recall the early signs of accumulation, pupils widely dilated with blurred vision, erythematous

*See Treatment of Pneumonia. *New York Medical Journal*, January 8th, 1910.

eruption, scarlatiniform in character, excessive dryness of the mouth, and rarely a talkative delirium.

I have seen these coryzas outlast the attack until one despaired of ever giving relief and then clear up in forty-eight hours after changing to a new locality.

Of course one must be assured that there is not a suppurative process in one of the sinuses.

I might add that some of the cases run over into a chronic bronchitis or that small abscess cavities form or bronchiectatic cavities and that a patient may become a veritable bacillus carrier.

The nervous system shows the effect of the toxemia in no inconsiderable number of the cases.

Neuritis may occur as after any infectious disease and occasionally a true meningitis; but, as strikingly frequent, follow neuralgias. Marked mental depression, which all too often becomes melancholia, or other psychoses make their appearance. These must be dealt with as under other circumstances.

In children one may see symptoms of meningitis which are more commonly due to a meningismus or serous inflammation rather than to the present of the influenza bacillus or other pyogenic organism.

In such a case a lumbar puncture should be done; first, that by examination of the fluid we may determine the presence or absence of the organism, whether it is purulent or not, that is, whether we have to deal with a purulent or serous meningitis; and second, because such a procedure often brings prompt amelioration of the symptoms. I have seen nothing more striking than the improvement following up this procedure.

I would emphasize two facts borne in upon me by my children's service at Bellevue Hospital; first, that this condition of meningismus, under which I include cases of serous meningitis, is extremely common in many acute infections and also in gastro-intestinal disturbances and second, that the differentiation from a suppurative meningitis is in a large percentage of these cases possible only by a lumbar puncture, a procedure followed by more fruitful results than any other measure of clinical diagnosis with which I am familiar.

In some cases the fever drags out to unusual lengths. This is seen at times in children. They should be put in the fresh air as much as possible and their nourishment properly considered.

It is more than doubtful if any drugs have influence on this prolonged intoxication. When all other measures have failed there is one that has results so striking and on the whole so reliable that it needs no emphasis, namely change of air.

This is more easily attained with children, with whom transportation is a relatively easy problem.

Moreover, a removal to a remote quarter, to an entirely different climate, is not necessary.

Equally good results I have seen by sending cases to places no farther removed from New York than Atlantic City, Lakewood or Greenwich, nor have I been able to determine that the woods or the shore offered any peculiar advantage the one over the other. I have seen a child sent to Lakewood after running a temperature for weeks with prompt subsidence of symptoms, only to relapse on a return home, to as promptly subside again after a second trip to Lakewood. There a longer residence effected the cure. These prolonged cases in children associated as they often are with a cough and a slight bronchitis not infrequently arouse the fear of incipient tuberculosis.

Prophylaxis.—Were the mortality of influenza as high as that of tuberculosis or of pneumonia or were the mortality directly traceable to the infection as in the case of typhoid, no doubt we should more fully appreciate the importance of prophylaxis and urge its carrying out, but we do not look upon influenza as a highly dangerous disease and we do not attribute the deaths from pneumonia to the Influenza infection with sufficient emphasis, so little precaution is taken to protect the individual or the community.

There are three ways in which the disease is especially spread, first by those who are a little ill, are suffering from a "common cold" and move about among their fellows, infecting as they go; second, by the very ill who infect other members of the family or attendants because knowledge of the mode of transmission is not known and precautions are not insisted upon by the attending physician; and third, by the carriers of the bacilli, people with a chronic cough, sufferers from chronic bronchitis, bronchiectasis or abscess.

Lord found the organism present in 25 to 59 per cent. of unselected cases of chronic cough and expectoration in interepidemic periods.

With the first class of cases, patients should be instructed as to the meaning of "common colds" that occur in epidemics, how easily their cough, with its spray of infecting organisms, can pass on the disease of perhaps fatal severity to those in contact with them; that coughing and sneezing should be done into a handkerchief, that sputum should be destroyed and that intimate contact, kissing, etc., should be sedulously avoided.

Perhaps no more certain source of infection exists than the common carriers.

How, wedged into a car or train, in the hours of crowded traffic, with sneezing and coughing all about, with insufficient ventilation or such a one as constitutes a draught to blow over the heated skin, could one escape infection? So far as possible these places should be avoided during an epidemic.

Of the second class of cases, the family should be instructed that the patient is a source of infection and that remaining unnecessarily long with the patient increases the danger; the nurse should be instructed to see that

the secretions are received into proper receptacles, vessels provided with 5 per cent. carbolic acid, or into cloths that should be burned; that the clothes in contact with the patient should be sterilized by boiling, that his utensils and thermometer be kept separate and that after he has convalesced, the room should be fumigated with formalin.

With reference to the third class of cases, more difficulty exists until the health authorities make more inquiry into the nature of chronic processes and take measures for the public protection.

CONTRACT PRACTICE IN FOREIGN COUNTRIES.*

By WILLIAM B. CHAMBERLIN, M. D., of Cleveland.

Whatever may be our personal opinion in regard to the merits of contract medical practice at the present time matters but little. There are two facts of which we must take cognizance. (1) It is an institution which is already firmly organized and flourishing in our midst. (2) It is an institution which has come to stay. With these facts in mind, our thoughts and efforts should be directed toward its proper regulation and control: having in mind not only the welfare of the medical profession but, what is of more import, the welfare of those to whom they minister. The institution with us is still comparatively young, and while we recognize its abuses and dangers, and perhaps appreciate the unfavorable outcome if certain tendencies remain unchecked, certainly our appreciation will be quickened by a brief survey of the contract system as it exists in foreign countries.

In the short time at my disposal it would be impossible to deal exhaustively with the system in general or to describe minutely those in vogue in the various countries. I have accordingly selected the systems of Austria, Germany and England as examples most likely to influence similar institutions among ourselves, and will confine myself to the influence of the contract system upon the welfare of the medical profession, as being the topic in which we this evening are most interested.

In Austria, as the result of a law enacted in 1888, insurance against loss of pay by sickness or accident was made compulsory for all engaged in manufacturing, trade and commerce. Company officials were exempted, if proof was furnished that they were protected in other ways. Officials of the government, state and municipality were further exempted, as were also sailors, foresters, farmers and house servants. This law of 1888, although its many shortcomings are fully recognized, and in spite of most earnest efforts for its amendment, is still in force in its original form to-day, twenty-three years after its enactment. This industrial insurance is administered by organizations known as *Krankenkassen*, which take their names from the limitations of their scope; *Genossenschaftskrankenkassen* administering to those in a certain trade and existing only in the large towns; *Bezirkskrankenkassen*, to those of all trades residing in a certain district; *Betriebskrankenkassen*, to those working for the same employer, etc. *Bruderladen* is an old name for association of miners, while *Krankenvereine* are friendly societies which

*Read before the Cleveland Academy of Medicine, October 20th, 1911.

insure for a certain indemnity in case of illness but do not provide medical attention.

According to this law of 1888, the insured and their families receive free medical attention, care in childbirth and all medicines or other therapeutic measures. In addition the assured receives in case of disability 60 per cent. of his daily wage for a period of twenty weeks. Care in hospital may be considered a substitute for this amount. In case of death an additional amount is allowed for burial. An idea of the increasing popularity of the Kassa system may be gained from the following statistics. In 1890 there were 2,470 K— with 1,548,825 members; in 1905 there were 2,934 K— with 2,844,245 members. In other words, while the number of Krankenkassen had increased only 7.08 per cent., the number of members had increased 83 per cent. The inclusion of other societies would bring the total membership up to 3,082,669, while the inclusion of the families would give a total of over 4,000,000 people in Austria receiving free medical attention. This constitutes 15.4 per cent. of the entire population, while if the statistics are limited to the larger towns, the country districts being excluded, a conservative estimate places over 50 per cent. of the people as included among those who pay no direct fee for medical attention. The effect of such a system upon the medical profession may be deduced from the following:—

Out of 9,204 physicians in Austria over 30 per cent. have a total income of less than (K 1,200) \$240 a year, 25 per cent. an income of (K 2,400-3,600) \$480-\$720, 33 per cent. \$720-\$1,440, not 10 per cent. \$1,440-\$2,400, and only 300 physicians in all Austria have an income of more than \$2,400. In Vienna alone, out of 1,930 physicians in 1898, only 1,158, or a little more than 50 per cent., had an income of more than (K 1,200) \$240. In Bohemia the conditions are still more unfavorable than in Austria. An idea of the financial reward to one engaged in the Kassa business may be gained from the related personal experience of one Gottlieb Pick of Aussig, whose monographs on the subject I can heartily recommend to those interested. After an experience of fifteen years as physician for a Berzirkskrankenkassa, he gives the following data for the year 1906. Number of members 8,448, cases of sickness 10,670. The compiler was only one of a number of physicians employed by the Kassa. In the following he counts an office call as 1 unit, a house visit as 2 units, special services such as bandages or operations as 2 units. In the year of 1907 he treated 2,023 cases, making 397 house visits, 5,474 office calls and 527 special, a total of 7,996 units. For this he received the munificent sum of (K 2,211) \$442.20, an average of (27.9h) .0558 cents per unit. As physician to the Betriebskrankenkassa his pay was slightly more. These figures agree with those of other districts and the country in general.

In Austria the control of the Kassa system is entirely in the hands of laymen, who neglect no opportunity to further reduce the miserable fees

paid to the profession for their services. Under the present or Pauschal system a lump sum is paid to a physician or group of physicians for their services to the Kassa, a fixed amount of money for an indefinite amount of work. Little or no choice is allowed a member in selecting his physician. Much of the work is accordingly indifferently or poorly done and dissatisfaction on the part of members is frequent. Any demands for increased fees are met with indifference or flat refusal, for, with little or no organization on the part of the profession, the directors know but too well that a dozen are waiting to take the place of one who resigns.

Not only has the Kassa system reduced to an absurd minimum the fee which it pays for medical service, but, with no income limit to regulate Kassa membership, the influence of the Kassa has been to reduce medical fees in general. The cost of medical attendance per member per annum was (K 2.32) 46.4 cents in 1890, but had risen to (K 3.21) 64.2 cents in 1905. This includes the lay control of the Kassa, which conservative estimates place at 20 per cent., thus leaving in reality but (K 2.57) 42.4 cents to be paid per member per annum for medical attendance. Not only the poor but frequently the well-to-do, and even the rich, take advantage of Kassa membership.

The demands of the physicians for the betterment of their conditions are in the main as follows:—

- (1) Kassa membership to be dependent upon income.
- (2) Free choice by members among a fairly large number of physicians who have signified their willingness to do Kassa business.
- (3) Fee to be determined by agreement between Kassa and Physicians as a whole, not with individuals.
- (4) In case of the Pauschal system, limitation of amount of work to be done for a certain sum.
- (5) Representation by the profession in the directorate of the Kassa and recommendation by the profession of those fitted to do Kassa work.

It requires only a casual perusal of current medical literature in Austria, or a slight acquaintance with the system at present in vogue, to convince one of the importance of the present struggle to the profession. It is virtually a question of life and death. The continuance of the present system can only mean a deteriorated medical profession, with an ultimate baneful effect upon the community at large.

Current German medical literature is strangely silent on the subject of Kassa practice. With a censored press and the Kassa under state control, the reason is perhaps not difficult to imagine. Two illuminating articles in our literature by Wm. L. Holt, Vice-President of the American Society of Medical Sociology give a fairly clear idea of the situation. The first gives his personal observations in regard to the Kassa in Friburg.

German industrial insurance is divided into three classes: (1) accident; (2) illness; and (3) old age. There are in all some 23,000 different

Kassas with a membership of over 20 millions. Insurance is compulsory on all whose income is less than \$1.60 per day or \$480 per year. This great system disburses to its beneficiaries \$400,000 per day or \$150,000,000 per year. To raise this enormous sum each laborer pays $2\frac{2}{3}$ per cent of his daily wage, amounting to $\frac{2}{3}$ of the total amount. The remaining $\frac{1}{3}$ is paid by the employer. This insurance provides free medical attention in accident, sickness and maternity cases, free hospital, free drugs, including spectacles, with allowances for disability, convalescence after childbirth, and funeral expenses in case of death. For convalescent cases great sanatoria are provided in the Black Forest. In Freiburg free dentistry is also provided. Treatment in the various specialties, as well as surgical operations, is provided free in the University Clinics.

The conditons in Freiburg may be taken as an example of those existing elsewhere. Here in 1909 there was a membership of 14,577, including 4,000 women. Out of 16,000 families 12,000 were insured. The fee bill is as follows: Office call 15c, house visit first time 32c, subsequent visits 24c, night visit 96c, minor surgical operations, such as passing a catheter or opening an abscess 24-48c additional, reducing a fracture, dislocation or strangulated hernia \$1.20, larger surgical operations \$2.40-\$3.60. Normal childbirth \$1.20, difficult obstetric operations \$2.40-\$3.60. Usually the Pauschal, or total amount set aside for medical fees, is not sufficient, and a corresponding reduction is made. In 1909 this reduction amounted to 13.8 per cent. The total cost per member per annum was \$1.32. Druggists, however, received much better treatment than physicians, being required to make to Kassa members a reduction of 20 per cent. from the prices usually charged.

Under the title "Why German Lodge Doctors Strike" Dr. Holt gives some further interesting information. Strikes, it seems, have been fairly common among medical men in Germany for the past ten years. The most famous one was that in Leipsic in 1904. In 1904 the insured in Leipsic numbered 180,000. The fee scale was still that introduced in 1872, day visit 24c with mileage at 12c per kilometre extra, night visits 48c, office calls 19c, obstetric and surgical operations extra. Again this scale might not have been so bad if paid in full by the Kassa. Frequently the amount paid was only 40 per cent. of that charged; the average for a period of years being 58 per cent. In 1904, the demands of the doctors for free choice by the patients of their attendant and for an increase in the Pauschal being refused, the entire profession promptly went on strike, all but three members ultimately joining. The result was free choice of doctors and the raising of the percapita tax to \$1.80. So 375 organized lodge doctors raised the price of medical fees $66\frac{2}{3}$ per cent."

At the present time great interest is being manifested by the profession in England in the introduction by Mr. Lloyd-George of the so-called

General Insurance Bill. The reading of this bill in parliament was received by all sides, without regard to party, with the greatest enthusiasm. It is looked upon in many ways as the greatest measure before parliament in two generations. It provides for free medical attendance in accident, sickness and maternity cases and carries with it benefits for those incapacitated by sickness or accident, as well as those subjected to frequent periods of unemployment, where depression from commercial cases is most frequent. The total cost for the first year will be \$122,500,000. It is proposed to raise this enormous sum by a tax upon the men, their employers and the state. Whereas the states' contribution in the first year will be but \$12,500,000, it is proposed to make this contribution increasingly larger year by year. This insurance will be divided into two funds: (1) the compulsory and (2) the voluntary. Under the compulsory division will be embraced all employed who earn weekly wages or whose annual earnings are under \$800, the minimum for taxable incomes. Soldiers, sailors, teachers and certain casual laborers will be exempt, though it is planned to make special provisions for these later. The men are to contribute 8c per week, women 6c, the employer 6c and the state 4c per person. Persons earning under \$4.25 per week will contribute less, but their employer in such cases will contribute more. Those over 65 years will be exempt, while those over 50 years of age will receive reduced benefits. Under the voluntary class will be embraced small tradesmen and those who have no employers. Here the men will contribute 14c and the women 12c per week. This general insurance bill includes and extends benefits to approximately 15 million persons. The allowance in cases of illness will be \$2.50 weekly to men and \$1.75 to women for a period of three months, thereafter \$1.25 per week to both, and a disability of \$2.25 per week. Persons under 16 will receive only medical attention.

The attitude of the medical profession toward the impending measure since its first reading seems to have undergone a decided change, if one can judge from the frequent editorials and communications in the British medical press. Whereas the measure was received at its reading with enthusiasm by the profession as well as the laity, before its specific details were published and considered, this enthusiasm has now changed and the feeling of hope regarding Mr. Lloyd-George's attitude to the profession has given way to one of general distrust and antagonism.

Up to the present time industrial insurance in England has been voluntary, not compulsory, and all forms of industrial insurance have been under the control of the so-called Friendly Societies. In order to keep the cost of insurance low, the plan of these societies, in England as elsewhere, has been not so much to economize in administration as to drive sharp bargains with the profession for their services. With a profession already overcrowded and the medical colleges of the country each year producing an output which the country did not need, this

has always been easily possible. A man in the insurance work had only to signify his unwillingness to continue at the same or even a reduced compensation. Dozens could immediately be found to take his place at practically whatever fee the directors of the society felt called upon to give. This fee at the present time amounts to (4 S) \$1.00 per member per annum, hardly the wages paid to cab drivers and laborers, and includes drugs, bandages and other therapeutic measures. The new measure proposes to divorce medical services from the dispensing of drugs, but only advocates an increase per person per annum to (6 S) \$1.50, including both. So the feeling of hope of a fair treatment at the hands of the secretary has given way to one of antagonism and distrust. From many sources it is even being urged that the time is now ripe for a flat refusal of the profession to engage in contract practice on any other basis than the work done. Sir Alfred Pierce Gould, in a timely article in the *Lancet*, urges the profession as a whole to have nothing whatever to do with contract practice, but to insist upon a treatment similar to that afforded to nurses, landlords and tradesmen; while a German correspondent in the same Journal regrets the retention of the per capita basis, which offers a fixed and extremely low amount per individual for an unlimited amount of work, and asserts that the British medical man is asked to begin work at a wage which his German brother has already found niggardly and insufficient. German statistics, according to this writer show that the actual cost of medical attendance and drugs is (10 S 5½ D) \$2.67 per member per annum. Certainly the German profession is not overpaid.

As a result of the impending measure the profession in England has been aroused and united in a way never before realized. Mass meetings have been held throughout the country and the attitude of the government toward the profession condemned by the British Medical Association, the General Medical Council, the Royal College of Physicians, the Royal College of Surgeons and many other societies of scarcely less prominence. In response to invitation, the Chancellor has appeared before the members of the British Medical Association and, while certain demands of the profession were acceded to, he declared his utter inability to fix a wage limit for industrial workers. The demands of the British Medical Association at the present time are in brief as follows:—

- (1) Insurance to be extended only to those having an income under \$10.00 per week.
- (2) Free choice among a fairly large number of medical men previously appointed.
- (3) Medical and maternal assistance to be regulated and administered by Local Health Commission and not by the Friendly Societies.
- (4) The method of remuneration to be adopted by the Local Health Commission in accordance with the preference of a majority of the profession in a given district.

(5) Medical remuneration to be what the profession considers adequate, having due regard to the duties to be performed and other conditions of service.

(6) Adequate medical representation on the various committees and boards of directors.

What attitude the government will take toward these demands is as yet unknown. Certain it is that a united medical profession will be in a position to demand a scale of prices commensurate with the service rendered and befitting the dignity of a profession which to-day is making greater demands upon its members, not only in preliminary training, but also in subsequent effort and self sacrifice than any other calling or profession in the world.

Such, we see, has been the effect of contract practice upon the profession in foreign countries. If statistics with us were as carefully compiled and statements honestly given by members of the profession, would we not perhaps find that conditions in many instances are little or no better than those abroad? How many surgeons in the United States to-day are doing a vast amount of work for a great railway corporation, the only compensation being in many instances an annual pass which they never use? The etiology and the disease, which at no very remote day threatens the life of the profession, is easily recognized. Should not the therapeutic measure be equally plain? A united medical profession, here as in England, can say to industrial organizations and brow-beating insurance companies, "Reduce to a minimum, if you will, the cost of industrial insurance, but this reduction in cost, this underbidding of your competitors in order to gain business must not be by the absurd reduction of medical fees. It must not be at the expense of the medical profession."

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GUMMA OF THE STERNUM.

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E. J., female, negress, *aet.* twenty-four, married at the age of fourteen, but separated from her husband, was admitted to the medical clinic of the University of Kansas, June 8th, 1910. Her family history was uninformative; her personal history disclosed a somewhat vague account of a suspicious labial sore about six years before.

For the past eighteen months there has been growing slowly but steadily, a tumor in the upper part of the middle of the chest. This at first had been painless, but is now extremely tender and so painful as to interfere with the patient's rest and sleep, and to compel her to stop her work as chambermaid. She had lost about 12 lb. in the last six months. She had been treated at various dispensaries and by various physicians, without success.

Examination revealed a swelling, $3\frac{1}{2}$ by $4\frac{1}{2}$ inches, exactly in the region of the manubrium sterni. It was soft and tender, and two fistulae discharged a thin seropurulent material having no odor. The inguinal and epitrochlear glands were enlarged. The tibiae were smooth. There were no scars on the body, no remains of the sore on the labia. Physical examination of the nose, throat, gums, neck, thorax and abdomen revealed no other noteworthy abnormalities.

Temperature 98.6° F.; pulse 86; leucocytes 12,000. The discharge from the fistula was examined for spirochætæ by Mr. Hissem. None was found.

Course.—An aseptic dressing was applied to the tumor and the patient was given a solution of potassium iodide (of the strength of gr. i to drop i) and instructed to take ten drops in milk three times a day and to increase each dose two drops a day, under observation.

June 25th.—Patient is taking 36 grains of potassium iodide three times a day. Dressings have been applied daily. The pain has disappeared.

July 2nd.—Swelling decreasing. Discharge lessened.

July 13th.—Patient feels very well. There is no pain or discharge.

July 26th.—Tannate of mercury, in the dose of gr. i three times a day, was added to the potassium iodide.

August 3rd.—Patient has a profuse flow of saliva, with very sore gums and teeth. The tannate of mercury was discontinued.

September 6th.—Patient has gained 10 lb. The tumor has gone down one-half. It is firm and not tender. There is no pain and no discharge. The fistulæ are healed. Patient is at work as chambermaid.

In view of the common occurrence of gummata in the sternum, or the sternoclavicular articulation, it was a matter of considerable surprise to find almost no reference to it in the general literature. Osler mentions



Fig. 1.—E. J. Gumma of the Sternum.

it neither in his "Textbook on the Practice of Medicine" nor in the chapter on syphilis in "Modern Medicine." Struempell ("Spezielle Pathologie und Therapie," Leipzig, 1907, 16th Ed.) has no reference. Keyes ("Syphilis," Appleton and Co.) has no reference. Goldthwait, Painter and Osgood ("Diseases of the Bones and Joints," D. C. Heath and Co., 1909) has no reference. Nor has Von Leube ("Special Medical Diagnosis," translated by Salinger, New York, 1907). Cabot¹ mentions parenthetically the possibility of its occurrence in this region. Lexer² has the same sort of reference. Baeumler, in Ziemssen's "Cyclopedia of Practical Medicine," has a very complete description of tertiary bone syphilis; but, in stating that its special predilection is for bones covered only by integument, he catalogues every such bone except the sternum. Townsend, in Morrow's "System,"³ quotes Jullien to the effect that out of 69 cases of bone syphilis in general, the sternum was affected

fifteen times. These cases, however, included necrosis, exostosis, and osteitis, as well as periostitis and gumma. Kœnig⁴ mentions it somewhat more especially, and in von Bergmann's "Handbuch"⁵ there is a very fair description of the diagnosis and treatment.

In spite of this paucity, which to a great extent applies to the ordinarily accessible current medical literature, there being only one reference to gumma of the sternum in the new series of the "Index Medicus"¹¹ (which I have been unable to verify), the condition must be far from rare.

At the same small medical clinic where this one was observed, two



Fig. 2.—E. J. Gumma of the Sternum.

other cases have been seen within eighteen months: (1) A male, with multiple gummata, viz., a hard, tender plum-sized tumor attached to the sternum on the level of the fourth rib, and one on the inner third of the clavicle. Improvement was prompt under potassium iodide. (2) Young female, with a soft but not suppurating tumor on the manubrium. She was seen only once.

Pathology.—There may be one of two conditions present: First, a periostitis, leading to a *caries sicca* in the underlying bone, and an ulceration or excavation surrounded by a hard bony wall, so that in some cases

the tumor (pus, debris, etc.) can be bodily lifted out from the bone. Secondly, a gumma primary in the medulla of the bone, infiltrating the canaliculi and forming a sequestrum; the periosteum and integument are then affected secondarily.

In this case the bone is certainly affected, as revealed by the *x*-ray negative, for which I am indebted to Dr. E. H. Skinner. Whether the process began as a periostitis, or directly in the bone, it would be impossible to say.

Diagnosis.—The most frequent tumors resembling gumma in this site are tuberculoma and sarcoma. Kuemmell⁵ recites a case in which Koester removed a portion of the sternum with a tumor which he believed to be a sarcoma, and which microscopical examination proved to be a gumma. Thus the diagnosis is important. Koenig⁶ states that while both suppurate, a tuberculoma causes more pain and has a thinner, more opaque discharge than a gumma. Craig⁶ reports a case of lymphosarcoma (myeloma?) of the sternum, occurring in the course of lymphatic leukemia. Trzebicky⁷ has seen cases of chondroma and metastatic hypernephroma in the sternum, either of which might confuse a diagnosis. Jockmann⁸ reports osteomyelitis sterni after typhoid, and Longuet⁹ states that the most frequent tumors in the sternum are due to infectious diseases. While the photograph of our case somewhat suggests the picture of an aneurysm, the possibility of mistake is slight.

Treatment.—With the statement of Schede and Graff¹⁰ that gummata occurring in the sternum should be extirpated surgically and the patient put upon antisyphilitic treatment, one can hardly agree, in view of the steady favorable decline of the tumor and symptoms under potassium iodide alone. I have never seen a more favorable gumma for demonstrating to students the effect of classic antisyphilitic medication.

RADIOGRAPHY OF THE STERNUM.

The radiographic projection of the sternum upon a **negative presents difficulties**. The sternum is a thin, cancellous bone, occupying a longitudinal position in the anterior chest wall, corresponding to a similar position posteriorly of the complex spinal column. Attempts to make an *x*-ray examination of the sternum in the posteroanterior position will, therefore, obliterate the shadows of the thin sternum by the heavy shadows of the vertebræ costal margins and the arch of the aorta. We therefore find it necessary to project the shadows of the sternum at such an angle that the bone will present radiographic outlines which are not superimposed upon other bone shadows. This may be accomplished by placing the patient with the chest resting upon the table. The left shoulder is raised slightly, and the patient fixed in position by sandbags, etc. The *x*-ray tube is adjusted so that the direction of the parallel ray is from the left posterior scapular area obliquely toward the right subclavicular

space. This is the oblique left posterior, right anterior position in radiographic nomenclature. Albers-Schöenberg¹² favors a negative taken in the sitting position, with the plate anchored to the chest and the direction of the ray from the right posterior to left anterior. Contrariwise, we would recommend that the patient be lying upon a table or trokoskop as being more favorable to a comfortable adjustment of fixa-



Fig. 3.—E. J. Running from the centre above to the left below is the dense shadow of the vertebral column, parallel to the right of which are the anatomical outlines of the sternum. The upper part of the sternal shadow is occupied by the crescentic shadow of the gumma. Radiating from the site of the gumma and shadow are the outlines of the two clavicles. The apex of the lung shows up above the clavicle and bordered by the shadows of the first and second ribs above. For description of gummatous pathology portrayed, see text of article.

tion measures. The direction of the x -ray from left position to right anterior also throws the profile of the sternal shadow outside of the aorta. When the compression cylinder is used it may be adjusted to the area of the left shoulder-blade posteriorly and tilted so that it is focused upon the subclavicular area obliquely opposite.

The trokoskop, particularly the design of Hænisch,¹³ lends itself to

sternal exposures. With this apparatus the patient lies comfortably upon a canvas-covered table beneath which is the x -ray tube. The plate is held in apposition to the sternum and the patient slightly turned upon the left shoulder in the oblique position. Hænisch recommends, that an examination be made with the fluoroscope before the cassette enclosing the plate is adjusted, to insure a correct position.

The exposure can be made with rapidity by the use of an intensifying screen, in one to three seconds, with 20 ampères through the primary of a 15 to 20 inch coil and 10 milliamperes through a Walter 6 tube. With a heavier discharge coil or transformer a good picture may be obtained in half a second with the Gehler-Folie intensifying screen. The x -ray exposure must at least be made during arrested respiration.

Upon the x -ray negative we then obtain a clearly defined manubrium and gladiolus, with the right clavicle distinct, radiating upward and outward. The vertebræ and vertebral rib borders give a confused shadow to the right, and the left lung shadows surround the sternal shadows and extend to the left upon the plate.

X-Ray Report of Dr. Clendening's Case.—In this case the manubrium gives evidence of necrosis and an osteoporosis with gummatous exudation about the sternoclavicular articulation. The luetic bone pathology hardly extends into the gladiolus. There is a crescentic involvement of the manubrium, with scalloped areas surrounded by dark shadows showing the deposition of lime salts in the gummatous exudate. You will notice that the extent of the bone changes is greater than one would suspect from the external signs of this comparatively subcutaneous gumma. There is no involvement of the hilus glands at the roots of the lungs in this case.

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THE TUBERCULIN REACTIONS AND THEIR COMPARATIVE VALUE AS DIAGNOSTIC AIDS.

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In reviewing the literature on the subject, we find, on the one hand, authorities who disclaim the value of tuberculin as a diagnostic aid, and, on the other hand, those who in their enthusiasm regard every tuberculin reaction as positive evidence of active tuberculosis.

The scope of this paper is to discuss the *modus operandi* of the tuberculin reactions in general, also the various methods of application, and what is of the utmost importance, to elucidate a safe guide to the physician, through which he will be able to diagnose early active from latent or healed tuberculosis.

The foundation of the tuberculin-therapy, as well as the diagnostic methods to reveal tuberculosis, is the observation of Koch that tubercular guinea-pigs reacted differently to a renewed infection from healthy ones, in other words showed a certain amount of immunity to reinfection.

Further investigations confirmed the observation of Koch, and recent animal experimentation showed that infected animals developed sensitiveness to tuberculin after a certain inoculation period, said sensitiveness increased as the disease progressed, and diminished and finally disappeared altogether in moribund animals.

Similar observations have been recorded by clinicians on the human being.

It was further demonstrated that the dose of tuberculin used for these tests, as well as the degree of infection in the experiment animal, accordingly produced various results.

The tuberculin reaction manifests itself differently, therefore, according to the dose, the site of application, the clinical stage of the disease, and also the individual susceptibility towards the tubercular endotoxines and exotoxines.

The phenomena of the reactions are at times local, that is manifested as an inflammatory process at the point of application; and again general, of which at times a characteristic fever reaction is the only demonstrable effect of the systemic reaction. Other signs of the general reaction are malaise, lassitude, pain in the back and legs. At times a focal reaction takes place, consisting of severe inflammatory changes in the neighborhood of tubercular foci, producing even necrosis. All these reactions manifest themselves to the eye or ear of the observer, or upon palpation, according to their location and intensity.

General and focal reactions occur only, as a rule, when a sufficient quantity of tuberculin is introduced subcutaneously and absorbed into the general circulation. In exceptional cases, minimum quantities of tuberculin in highly sensitive individuals, no matter in which way applied, produce the above severe reactions, showing the danger of the indiscriminate use of concentrated tuberculin for diagnosis.

Various methods of application have been advised; five of the most important are cited below:—

1. Cutaneous method, after Moro. (Inunction of tuberculin on the unbroken skin.)
2. Cutaneous method after von Pirquet. (Inoculation of tuberculin after superficial scarification of the skin as in vaccination.)
3. Intracutaneous or intradermal method after Mantoux and Roux. (Injection of 1/100 mgrm. of tuberculin into the skin of the leg.)
4. Subcutaneous method, after Koch. (Injection of tuberculin under the skin for absorption into the circulation.)
5. Application of tuberculin to the mucous membranes. (Of which the conjunctival method after Wolff-Eisner and Calmette is the most important.)
6. Installation of a definite quantity of tuberculin into the conjunctival sac.

Of the many tuberculins advocated for these tests, the tuberculin O. T. (*typus humanus*) has stood the test of time and is the best, because it is as reliable as any other tuberculin; in addition, we have more comparative data from past experiences to guide us in our work with it, and it is of great importance for the sake of uniformity, that a reliable tuberculin be used as a standard by all investigators.

Statistics vary from 50 to 100 per cent. according to the prevalence of tubercular infections; suffice it to say that in our metropolitan centres nearly every adult has been infected at one time in his life. Recent investigations of Roemer and Joseph, and formerly von Behring's, tend to locate the infection period in childhood. Out of the large percentage of tubercular individuals, only a small percentage suffers or succumbs to the disease.

It becomes, therefore, of paramount importance to differentiate between active and latent tuberculosis.

The cutaneous methods, after Moro and von Pirquet, reveal both active and inactive tuberculosis, except during the first year of life.

Ellermann and Erlandson have modified the von Pirquet test recently, and perfected a technique to establish the degree of tuberculin sensitivity in tubercular subjects. Their method is complicated and awaits confirmation.

It might not be amiss to mention here that Muench, Wolff-Eisner and others have used the von Pirquet test for therapeutic purposes; however, I must warn against the use of concentrated tuberculin in this procedure, on account of its liability to produce dangerous focal reactions.

The subcutaneous method has the above disadvantages, and further, on account of its production of general and focal reactions, is dangerous to the patient.

The conjunctival method does not reveal all the early and active cases with one per cent. tuberculin solutions, as advocated by Wolff-Eisner; stronger solutions prove dangerous to the eye.

The safest method to test qualitatively the tuberculin sensibility is the intradermal test with definite quantities of tuberculin, as recently clini-



Showing intradermal test forty-eight hours after inoculation.

- I. Sol. carbolic acid $\frac{1}{2}$ per cent.
- II. 1/10,000 mgrm.
- III. 1/1,000 mgrm.
- IV. 1/100 mgrm.
- V. 1/10 mgrm.

cally tested by van Balen of Holland, and by the writer at Washington University Hospital, Medical Clinic.

The physician wishes to know whether the symptoms of his patient are due to an active tuberculosis and not whether his patient has a latent focus somewhere in the body. Furthermore, it is essential to use a method, which will in no way aggravate a tubercular process and endanger the chances of arresting the condition.

It is in the diagnosis of early active and doubtful cases that tuberculin

is supreme. In advanced cases, on the other hand, where the tuberculin sensitiveness has disappeared, a diagnosis stares the observer in the face, while in inactive cases tuberculin has only a statistical value.

I have added to the intradermal method a control test of 1/10 c.c. of a $\frac{1}{2}$ per cent. solution of carbolic acid, three extra dilutions of tuberculin O. T. representing 1/10 mgrm., 1/1,000 mgrm., and 1/10,000 mgrm., and changed the site of application from the leg to the arm.

The technique is as follows:—

The place of inoculation over the biceps muscle is cleaned with alcohol; then with a sterile platinum needle and glass syringe, the eye of the needle pointing upwards, inject 1/10 c.c. of the following five solutions:—Phenol, $\frac{1}{2}$ of 1 per cent.; O. T., 1/10,000 mgrm., O. T. 1/1,000 mgrm., O. T., 1/100 mgrm., O. T., 1/10 mgrm., at a distance of 5 cm. from each other, and allowing the solutions slowly to infiltrate the skin, producing a small papule.

A positive reaction takes place as a rule several hours after the inoculation to 1/10 mgrm. and 1/100 mgrm., and often also to 1/1,000 and even to 1/10,000 mgrm., showing greater intensity to the stronger solutions. After twelve to twenty-four hours the infiltration becomes visible and palpable, and the inflammatory reaction increases accordingly. At the end of forty-eight hours it has reached its greatest intensity. We see now a small central tubercle encircled with a zone of redness, shading off gradually into the healthy tissues. This zone of redness varies from 1 to 2 cm. The reaction fades away, as a rule, after two days, but persists at times for several weeks. The control shows a slight erythema, which becomes imperceptible after a few hours. A slight fever reaction occurs, occasionally due to a faulty technique, causing a portion of the tuberculin to be placed subcutaneously instead of intradermally.

Roemer has proved that the intradermal method is the most reliable one in animal experimentation.

Since the local reaction takes place in healthy tissue at a distance from the tubercular lesion, it can also be used in the tuberculin therapy, especially in fever cases, where an extremely mild method is advisable. The reactions being determined by doses ranging from 1/100 mgrm. downwards to 1/10,000 mgrm. will serve as a most important guide for the therapy of the case.

Since the index of the tuberculin sensibility is determined by the intradermal reaction, the dose of tuberculin to be used therapeutically is ascertained.

The intracutaneous reaction manifests itself after doses of tuberculin O. T. varying from 1/100 mgrm. downwards to even 1/10,000 mgrm.; accordingly we can start the test with 1/10,000 mgrm. if desirable.

The following conclusions are at present applicable until more precise methods are demonstrated:—

1. That we can demonstrate by the intradermal test, in doses from

1/10,000-1/100 mgrm., nearly all doubtful and early cases of active tuberculosis.

2. If after a 1/10 mgrm. injection no reaction occurs, we can exclude tuberculosis.

3. From reactions to doses between 1/100 and 1/10 mgrm. we can only conclude that latent tuberculosis is present.

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MEDICAL AND SURGICAL PROGRESS.

GOUT, ITS DIAGNOSIS AND TREATMENT.

A REVIEW OF RECENT LITERATURE.

By ALBERT E. TAUSSIG, M. D., of the Editorial Staff.

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Ever since Garrod some fifty years ago demonstrated the presence of uric acid in the blood of gouty patients, the true nature of this interesting affection has been the subject of endless discussion. The wide spread tendency, which lasted well into this century, to explain a great variety of obscure affections by the vague terms "uricacidemia", "too much uric acid" and the like, finally ended in a sceptical reaction that led many men to refuse to uric acid any pathologic significance what-

ever. Within the last ten years, however, our knowledge of the metabolism of gout has increased rapidly, culminating in the beautiful investigations of Brugsch and Schittenhelm. They were led to define gout as a disturbance in the fermentative processes that control the metabolism of the purin bodies. Uric acid is derived exclusively from the disintegration of substances contained in the nuclei of cells. The substances may have two distinct sources: the nuclei of cellular tissue in food and the nuclei of body cells that have undergone destruction. The former is called "exogenous" uric acid and may ordinarily be diminished or increased at will, the latter is the "endogenous" uric acid, which varies considerably in health, but still more in certain diseases. Normally, the nucleo-proteids are split up, by ferments, with the production of nucleinic acid. From this in turn a variety of so-called purin bodies are derived, first the amino-purins (guanin and adenin), then xanthin and hypoxanthin, and finally uric acid. The last is excreted in part as such, in part is split into ammonia and carbonic acid.

In gout this entire process is seriously interfered with. The faulty purin metabolism leads to the production of an abnormally small amount of uric acid but this latter is both destroyed and excreted to an insufficient extent. The result usually but not always is an accumulation of uric acid in the blood, as was shown by Garrod half a century ago. Gudzent has recently shown that uric acid in the blood, exists always as a sodium salt, a mono-sodium-urate, also called sodium biurate. This salt may exist in two forms, one very soluble but very unstable, the other stable but much less soluble. In health the body seems to have the power not only to excrete the uric acid as soon as formed, but in case of a temporary retention to convert the poorly soluble form into the more easily soluble and more readily excreted form.

In gout the ability to handle uric acid seems diminished in every respect. The result is a gradual accumulation of mono-sodium-urate in the blood and in the less soluble form at that. Sooner or later the limits of solubility are passed and we have a deposit of the urate in crystalline form, chiefly in the subcutaneous tissue or in the joints. There is still some difference of opinion as to whether an acute attack of gout is due to the deposit or to the reabsorption of the urate crystals in the joints, but on the whole the latter seems the more likely. For one thing, it has long been known that the amount of uric acid, excreted in the urine, is ordinarily abnormally small, especially just before an attack. During the attack, however, it is usually increased and may attain extraordinary proportions. After a severe attack, the patient feels unusually well for awhile. This is all in harmony with the theory that an acute attack is due to a change in metabolism that temporarily enables the body to dispose of its uric acid and that the acute arthritis is due to the going into solution of the urate crystals previously deposited in the joints.

DIAGNOSIS.

Clinical Picture.—In a review of this sort, it would be out of place to discuss the symptomatology in any detail. The clinical picture of gout was as well known to Sydenham as it is to us and there have been no important additions to our knowledge of this aspect of the disease for over a hundred years. It is certain, however, that while less frequent than in Europe, gout is by no means uncommon in this country but that only a small minority of the cases are ever correctly diagnosed. One reason

for this is the fact that the so-called atypical cases are far more frequent than the typical ones. A multitude of obscure affections of the joints, skin, digestive, circulatory and nervous system are really gouty though never diagnosed as such. The presence in the ears or elsewhere of subcutaneous, gouty tophi usually clears up the diagnosis. In their absence, a diagnosis may be impossible or at any rate possible only with the help of modern refinements of diagnosis which will be described below.

Uric Acid in the Blood.—One of the most constant phenomena of gout is the presence of uric acid, or rather of urates, in the circulating blood. Other conditions may produce this uricemia. Thus an individual, whose diet is rich in nuclear matter, may show uric acid in the blood (exogenous uric acid); in pneumonia and in leucemia the rapid destruction of the white corpuscles, uniformly loads the blood with purin bodies; in chlorosis a similar condition, but less marked, has been noted; in nephritis the excretion of uric acid may be so interfered with as to lead to its retention in the blood. These conditions are however usually readily distinguished from gout. If, in the absence of pneumonia, chlorosis, leucemia and nephritis, the patient is put on a purin-free diet (to be described below) for a number of days, and still shows the presence of uric acid in the blood, the diagnosis of gout is practically certain. The constant absence of uric acid in a number of tests speaks probably but not certainly against the diagnosis of gout.

The simplest method of demonstrating the presence of uric acid in gout is that described by Garrod some fifty years ago. A little blood serum or blister fluid is placed in a watch-glass, acidified by means of acetic acid and slightly concentrated. A thread is then placed in the mixture and if uric acid is present in excess, its crystals may form on the thread. This test is however not at all delicate and, even in outspoken gout, fails far more often than it succeeds. Until recently the only trustworthy methods of determining the presence of uric acid in the blood was by elaborate and difficult methods that required 100 c.c. or more blood. This last fact alone prevented the utilization of these methods for clinical purposes. Within the last year and a half however, two new methods have been described that promise to be of practical diagnostic importance.

The first is that of Roethlisberger.* His is of extreme delicacy requiring only a few drops of blood. It is based upon the ability of uric acid to reduce silver salts. The method in brief is as follows: A strip of filter paper, previously treated with silver nitrate solution is soaked with a solution of sodium carbonate; upon this moist paper are deposited one or more drops of the blood serum; the paper is then placed in ammonia for 15 minutes, washed and dried. If the blood contains uric acid a permanent dark spot will appear upon the paper, the blackness of which depends upon the amount of uric acid present. One disadvantage of this method is that it must be carried out in the dark-room or at least by very weak artificial light. Nevertheless its simplicity is such, that if further work confirms its trustworthiness, it will be a valuable addition to our diagnostic methods.

A less simple, but still more promising method is that of Kowarsky. From a vein, near the bend of the elbow, 10 c.c. of blood are aspirated and immediately stirred into 30 c.c. physiologic salt solution. The mix-

*The entire apparatus, with paper, pipettes, etc., may be obtained from M. Schaerer, A. G., in Berne, Switzerland. It is called "*Blut-Urikometer*," and costs Fr. 27.50.

ture is then poured slowly into 50 c.c. of a boiling solution of 0.5 per cent. acid sodium phosphate. Having been diluted and again boiled, whereby the proteids are nearly completely precipitated, the whole is then poured into an evaporating dish and concentrated on the water-bath to 3 or 4 c.c. These are then placed in a centrifuge tube and centrifugated. The supernatant fluid is poured into another centrifuge-tube, a few drops of 10 per cent. sodium hydrate added and the mixture saturated with ammonium chloride. After standing over night, the excess of ammonium chloride is dissolved by the addition of a few drops of water and, after centrifugation, the sediment is treated with a few drops of strong hydrochloric acid. Uric acid, if present, crystallizes out and may be recognized microscopically or better still by means of the murexid test. It may even be estimated quantitatively, but this will rarely be of practical importance. This method appears fairly complex, as here described, but is far simpler than the older methods of Salkowski, Hopkins or Krueger and Schmid and has the advantage of requiring much less blood. It has been carefully tested and it seems that normal blood is always entirely negative or nearly so, whereas gouty blood, which contains from 2 to 6 milligrams of uric acid per 100 c.c. of blood always gives a distinctly positive reaction.

Uric Acid in Urine.—At one time it was thought that an excess of uric acid in the urine was characteristic of gout. This is by no means the case and indeed a single urine examination can never throw any light upon the presence or absence of gout. Ordinarily the amount of uric acid depends chiefly upon the amount of purin bodies in the food. If however this source of uric acid is eliminated by placing the patient on a purin-free diet, much information can be obtained by means of systematic urine examinations, and this in two ways.

A sluggish elimination of urates is characteristic of gout. If the patient is on a purin-free diet, the twenty-four-hours urine will contain a small and fairly constant amount of urate. If he now takes a single meal rich in purin bodies, say a dish of sweet-breads, the elimination of the urates may be watched. Normally it is rapid. The next day's urine is very rich in urates, but, on the day following, the amount has dropped to its former level. In gout, however, the elimination is much slower and less intense, extending over several days.

In the paroxysm, gout also produces characteristic urinary changes. Just before its onset and during the first day or two of the acute attack, the amount of urates in the urine is abnormally small. Later and throughout the attack, the amount of urates excreted is great and may attain extraordinary levels, gradually returning to normal after the conclusion of the paroxysm. This behavior of uric acid excretion can of course be used for diagnosis only if the patient is on an absolutely purin-free diet, but that will usually be the case. Then however it does become a characteristic, though not invariable manifestation of gout.

A simple method of following the excretion of uric acid in the urine is by means of the purinometer of Walker-Hall. The uric acid is precipitated by means of magnesium chloride and ammoniacal silver nitrate solutions and its bulk is read off directly as in Esbach's albuminometer. Like the latter, it does not give entirely trustworthy results but is sufficiently accurate to detect a considerable increase or decrease in the daily elimination of uric acid.

Radiography in Gout.—A useful method of distinguishing between gouty and other joint affections is by means of the *x*-rays. If a radiogram of the affected joint, showing as much detail as possible, is taken, one

can often distinguish between gout and the other arthritides at a glance. The urate deposits are far more permeable to the rays, than the lime salts of the bone tissue and hence are clearly visible as light spots in the bones near the affected joint. One is thus readily enabled to distinguish between gouty arthritis and the other chronic joint affections for which gout is most readily mistaken. The gouty joint is characterized not only by the pale urate deposits, but also by the entirely intact joint surfaces. In chronic articular rheumatism, on the other hand, the articular cleft is markedly narrowed; in primary chronic polyarthritis, it is almost gone and there is more or less complete ankylosis with marked atrophy and sclerosis of the bony tissue; in osteo-arthritis deformans, we seen distinctly destructive processes in the cartilage and osteophytic proliferation about the junction of bone and cartilage. In his work on diseases of metabolism, Umber has published a series of radio-grams illustrating the differences between the appearances of the joints in these various arthritides. Occasionally, however, the situation is not so clear. The gouty process may involve a joint previously altered by some other chronic arthritic process. In this case, the changes produced by the latter may overlie and hide the gouty concretions and the radiogram may actually mislead the observer. Thus Magnus-Levy in a recent communication reported a case that clinically seemed clearly gout but in which the radiogram showed merely the presence of an inflammatory flat-foot. The subsequent history of the case showed that the patient had undoubtedly gout and that the paroxysms were gouty attacks in the already altered joints of the flat-foot. This only means, however, that in gout, as in other pathologic conditions, no single sign is in itself absolutely pathognomonic.

TREATMENT.

During the Attack.—In the treatment of the acute gouty paroxysm we are still practically helpless. A long series of medicaments have been suggested and vaunted in turn but, perhaps with the exception of an occasional anodyne, such as a hypodermic of morphine, all have proven useless or worse than useless. This is especially the case with colchicum. That it can often cut short the paroxysm is undoubtedly true. But it does so by interfering with the absorption of the sodium urate crystals from the affected joint. The result is that the patient is relieved for the time being but, since the deposit remains unabsorbed, the next attack comes on all the sooner and the more violently. Moreover colchicum, in therapeutic doses, is a heart poison and doubtless the sudden death of gouty patients during the paroxysm has often been due to its use. Sydenham was the first to advocate an expectant attitude* and Trousseau, nearly two hundred years later, strongly urged that the physician do literally nothing at all until the paroxysm had passed. This attitude still holds good today. Perhaps a suggestion recently made by Falkenstein deserves to be considered an exception to this rule. If a local anesthetic (Falkenstein uses eusemin) be injected into the immediate neighborhood of the inflamed joint, the patient will be relieved from pain for several hours. When the pain returns, a fresh injection can be made. The advantages of this procedure are that it does not interfere with the restora-

*Sydenham, De Podagra et Hydrope, 1683. Hoc in morbo dolor amarissimum est naturae pharmacum, qui quo vehementior est, eo citius praeterlabitur paroxysmus, atque insuper et longior erit intermissio et magis perfecta.

tive processes going on in the joint and does not produce the undesirable constitutional effects inseparable from the repeated use of morphine hypodermically.

Diet.—In the treatment of chronic gout and for the prevention of acute paroxysms the strangest and most diverse dietaries have been advocated. Of them all the only one that has stood the test of time is expressed in the phrase in which Sydenham advised moderation in eating and drinking: "Primum in cibo potuque mediocritas est observanda." Theoretically something is to be said for the so-called purin-free diet. This consists in the avoidance of those foods that are especially rich in nuclear matter. They are meats and fish of all kinds, including meat soups and gravies, beans, lentils, peas, spinach, asparagus, mushrooms, oatmeal, certain fruits, tea, coffee, cocoa and the beers. The theoretic basis for this diet is the fact that gout is essentially a disturbance of purin metabolism. That being the case, the body has difficulty in caring for its endogenous uric acid, and would still further be hampered by a considerable supply of uric acid from without. It must be remembered however that a diet from which the above articles are eliminated in the long run becomes very unsatisfactory, so that patients usually rebel. Moreover, it is by no means certain that it is indispensable or even beneficial. We do not as yet know whether the body finds the same difficulty in managing exogenous as endogenous uric acid. For diagnostic purposes, if we want to determine the endogenous uric acid in blood or urine, a purin-free diet is of course indispensable.

A very interesting dietetic suggestion based upon careful experimental work was made by S. Cohen in a recent communication. He proceeded from the consideration that the greater the amount of sodium present in the sodium urate molecule, the less soluble the latter. Thus the monosodium urate present in gouty joints contains twice as much sodium as the hemisodium urate circulating in the blood. It seems rational to conclude that the smaller the amount of sodium taken in with the food, the less the tendency to the formation of the sodium-rich urates and therefore the less likely the formation of gouty deposits. He investigated this problem by observing the behavior of uric acid deposited under the skin of guinea-pigs under various conditions. He found that the greater the amount of sodium, especially in the form of carbonate, in the food the less the absorption of uric acid from such artificial deposits. The administration of potassium salts, or of foods rich in potash, caused active absorption of such tophi even if considerable sodium was given. It would therefore seem desirable to give gouty patients very little food rich in sodium carbonate and as much as possible of food rich in potash. A typical example of the former is meat; of the latter, potato and rice. Table salt seems to make less difference.

Medicinal Treatment.—The various so-called "uric acid solvents" (lithia salts, piperazine, citarin, uricedin, urosin, etc.) have justly fallen into disuse. Their vogue was always due far more to the manufacturers' advertising literature than to any real experimental or clinical demonstration of their usefulness. At the best, they are "test-tube remedies"; able to dissolve uric acid in the test-tube but without efficacy in the body. The alkalies too, as a class, have been shown to be harmful rather than beneficial in gout. Gouty blood is not less alkaline than normal blood. Moreover, the greater the amount of sodium in the urate molecule, the less soluble it is. An essential feature of gout is the inability of the body to convert the relatively insoluble monosodium urate

(sodium biurate) into the more soluble hemisodium urate (sodium mono-urate). An exception to the harmfulness of alkalies in gout may possibly be found in the potassium salts, not because of their alkalinity but because of the ability of the K atom to displace the Na in the insoluble urates. Their value however still awaits demonstration.

A much more promising method of treatment consists in the continued administration of large doses of hydrochloric acid, as first advocated by Falkenstein. He was first led to its use by the observation that gouty individuals nearly constantly showed a condition of complete or approximate gastric anacidity. In such doses, moreover, hydrochloric acid not only stimulates the activity of the liver, in which much of the uric acid destruction takes place, but also tends to diminish the sodium content of the blood. The increasing vogue of hydrochloric acid in gout is however based rather on empiric than on experimental grounds and is doubtless given additional impetus by the reaction against the use of alkalies. Falkenstein, Schmidt, Brugsch and others report large series of cases beneficially influenced by this treatment, sometimes strikingly so. Thus Schmidt, himself a sufferer from gout, says: "For nearly two years I have been taking conscientiously 60 drops=4.5 g. pure offic. 45 per cent. hydrochloric acid daily. In spite of this great quantity of HCl, I have noticed not the slightest ill effect upon my system nor the appearance of any distaste for the drug, on the contrary, after each meal, I experience a distinct desire for it. In my case, the results were simply astonishing. Although, in severe cases, Falkenstein promises results only after the lapse of many months or even a year, with me they were immediate, inasmuch as during the first quarter year the gouty attacks were only abortive, *i. e.*, lasting an hour or two, without much pain and without incapacitating me from work. Since this time, for nearly two years, I have been quite free from gout, feel bright and eager for work, although for a long time I have not troubled myself about diet or abstinence from alcohol, but on the contrary from time to time indulge myself in the joys of the table (of course only experimenti causa)."

"This striking result," he goes on to say, "I experienced not only in my own case, but in that of 7 patients, in my private practice, all with typical gout, some of them tortured for years by frequent and most violent attacks of acute gout, with involvement of the larger joints. The worst case, a merchant 40 years old, confessed the other day that, contrary to my instructions, he had never departed from his habit of drinking 3 bottles of beer daily and of indulging every Sunday in champagne, a beverage justly dreaded by the gouty. Nevertheless, since beginning the hydrochloric acid treatment, he had never had an attack."

His, while he admits the usefulness of the acid treatment, remarks that he has sometimes seen it fail in particular severe cases. The acid is given in large doses, from 50 to 90 drops of concentrated hydrochloric acid daily, well diluted and sipped during or after meals. The average dose is 20 drops three times daily; this should be taken in a pint or more of water. No ill effects need be feared from this or even larger doses.

Falkenstein recommends that, together with the hydrochloric acid, some iodine compound be administered, preferably a new synthetic, "iodglidin." He believes that the iodine facilitates both the excretion of uric acid and the elimination of the alkalies from the blood.

One other drug deserves mention in this connection. In 1908, Nicolaier and Dohrn discovered and studied the pharmacology of phenylin-carbonic

acid, the best of whose derivatives is being marketed under the name of atophan. Atophan, in some manner not thoroughly understood, has the power when administered in half gram doses of greatly stimulating the excretion of uric acid. If a healthy individual, on a purin-free diet, be given atophan, the amount of uric acid excreted in the urine increases rapidly, then diminishes but remains considerable as long as the drug is given. Upon discontinuing it, the uric acid in the urine almost disappears; then slowly returns to the normal. It is as if the atophan almost swept the system clear of uric acid. Frank and Bauch have observed similar phenomena when the drug was given to gouty patients and Weintraud reports good results in acute gout. While the remedy is still on trial, it has a thoroughly rational experimental basis. Its action is apparently the opposite to that of colchicum which rather interferes with the elimination of the offending substance.

Radium.—The most interesting recent development in this field is the therapeutic action of radium in gout. It had long been known that certain European springs exercised a distinctly beneficial action upon gout and it had also been noted that this same water when exported and used by the patient at home seemed quite inert. The explanation of this phenomenon is now clear. These springs are all of them highly radioactive and the water contains in solution considerable of the so-called "emanation," a decomposition product of radium. This emanation, being a gas, readily escapes from solution, and hence is lost in transportation. It seems, however, that it is not even the emanation that possesses therapeutic properties but a derivative from it, called radium D. As the latter is a solid, soluble only in strong acids, it cannot be administered directly. The emanation itself must be given, and allowed slowly to produce the radium D in the body.

The mode of action, in gout, of the emanation has been cleared up by the experiments of Gudzent and others. The former found that when the soluble sodium urate is produced in the test-tube it is rapidly converted into the less soluble form. If, however, the contents of the test-tube are exposed to the action of radium or its emanation, not only is this process delayed, but under favorable conditions it may be even reversed, the soluble form being produced from the insoluble, and the former converted into ammonia and carbonic acid. Gouty patients, saturated with the emanation, excrete their uric acid like normal individuals and their blood, ordinarily constantly containing uric acid may be rendered entirely free from the latter. Even tophi and gouty deposits in the joints are rapidly absorbed with the production of local necrosis. For a more detailed account of these phenomena the reader must be referred to the excellent articles of Kionka and His.

The clinical results of the emanation treatment of gout are very encouraging. Thus His reports 28 cases so treated; 4 were not improved, 24 were greatly relieved. Several patients reported that, during the year which had elapsed since the conclusion of their treatment, they had remained free from attacks. In two cases, subcutaneous tophi had also disappeared. Other observers report similar results. One interesting feature of the treatment is the so-called "reaction." The vigorous administration of the emanation is often followed by a typical attack of acute gout. This is evidently due to the going into solution of the sodium biurate in the joints, and according to Gudzent, is rather to be welcomed as indicating that the emanation is actively at work. In old and confirmed cases of gout, however, such a reaction may not be free from

danger and in them radium should be used cautiously, if at all. Marckwald and Nagelschmidt have shown that, with careful dosage of the emanation, such reactions can usually be avoided.

As regards the administration of the emanation, several methods are in vogue. The emanation being a gas, it can evidently best be administered by inhalation and this can best be done in an emanatorium. A stream of oxygen is made slowly to bubble through a liquid in which a considerable quantity of radium salt is dissolved. The oxygen, carrying the emanation with it, passes into a small room, into the air of which it is distributed by means of an electric fan. The patients sit in the room for an hour or more, several times daily. It is obvious that such an apparatus requires a considerable plant and is very expensive. A continually growing number of institutions, especially in Germany, has acquired this equipment, but the need of a simpler method of administering the emanation is keenly felt. The portable inhalation apparatus all suffer from grave defects, into which we cannot enter here. The administration of emanation-water by mouth, the hypodermic use of radio-active fluids, radio-active baths and the like, have all their adherents. Their value has still to be demonstrated. Certainly they do not as yet rank with the inhalation emanatoria.

SUMMARY.

The points brought out in this review may briefly be summarized as follows:—

ETIOLOGY.

1. Gout is not characterized by an excessive production of uric acid as was formerly supposed.
2. The gouty deposits are produced by deficient elimination of uric acid and by the tendency towards the production of the less rather than the more soluble form of sodium urate.

DIAGNOSIS.

1. The gouty patient, on a purin-free diet has constantly urates present in his blood. Thus phenomenon gout shares with a number of other diseases from which however it may readily be distinguished.
2. A single urinary examination is of no diagnostic value in gout. A daily determination of the uric acid in the urine, during the attack, or after a meal rich in purin-bodies, may give results that are almost pathognomonic.
3. Radiography is very useful in distinguishing the gouty from the other forms of arthritis.

TREATMENT.

1. In acute gout, active treatment is dangerous. The use of colchicum should be abandoned.
2. A purin-free diet is the only rational one in gout.
3. The use of large doses of hydrochloric acid deserves a trial; the use of alkalies, with the possible exception of potassium salts, is irrational.
4. The most promising method of treating gout is by means of the inhalation of radium emanation.

ACUTE POLIOMYELITIS.

A REVIEW OF RECENT LITERATURE.

By ALFRED FRIEDLANDER, M. D., of the Editorial Staff.

1. Lovett: Infantile Paralysis in the United States and Canada in 1910. (*Amer. Journ. Diseases of Children*, August, 1911.)
2. Dixon: Epidemiologic and Etiologic Studies of Acute Poliomyelitis in Pennsylvania. (*Amer. Journ. Diseases of Children*, October, 1911.)
3. Kennedy: Acute Poliomyelitis. (*Amer. Journ. Diseases of Children*, August, 1911.)
4. Morse: Acute Poliomyeloencephalitis. (*Boston Med. & Surg. Journ.*, January 12th, 1911.)
5. Levandowsky: Poliomyelitis—Collective Abstract. (*Jahrbuch fuer Kinderheilkunde*, Vol. 73, No. 4, April 1st, 1911.)
6. Marsh: Epidemic Anterior Poliomyelitis. (*Brit. Journ. Chil. Dis.*, July, 1911.)
7. Currie and Bramwell: Incubation Period of Poliomyelitis. (*Review of Neurol. and Psychiat.*, Vol. IX, p. 10, 1911.)
8. Koplik: The Cerebral Forms of Poliomyelitis. (*Amer. Journ. Diseases of Children*, August, 1911.)
9. Committee of the American Medical Association on Control of Poliomyelitis—Report. (*Journ. Amer. Med. Assoc.*, October 14th, 1911.)
10. Flexner: Control of Epidemic Poliomyelitis. (*Amer. Journ. Diseases of Children*, August, 1911.)
11. Knox: Treatment of Poliomyelitis. (*Amer. Journ. Diseases of Children*, August, 1911.)
12. Flexner and Clarke: (*Journ. Amer. Med. Assoc.*, Vol. LVI, p. 585, 1911).

[NOTE.—No attempt at a full bibliography is given here, of course. In a recent collective abstract of the American literature of the subject from January to July, 1911, Wachenheim notes fifty-six articles.]

“The great prevalence of infantile paralysis in the United States in 1910 and its rapid increase in the last two or three years in this country are matters which demand our serious attention.” These words of Lovett express the general concern which is felt everywhere concerning the spread of poliomyelitis. The literature is full of the subject. Careful investigation along the lines of epidemiology, direct etiology, pathology, clinical picture and treatment is being carried out in many places. Certain facts have been brought out with great clearness and a summary of these is here presented.

According to Lovett, for the ten years 1894-1904 inclusive, 157 cases of the disease were reported in the United States; an average of about

fifteen a year. In 1910 there were about 8,700 cases reported. There is a widespread and general distribution of the disease in this country, with, as a rule, a focal occurrence and radiation from these foci. The south-eastern section of the country shows the fewest cases.

Study of the epidemics in many communities has brought out the following general facts, repeatedly determined:—

The disease is found in scattered foci with cases radiating from these foci. It reaches its height in the late summer; it follows the lines of travel; it affects mostly children in the first dentition, the mortality rate ranges from 3 to 15 per cent. In October the epidemic usually begins to die out.

Lovett then points out that the mere collection of routine data cannot settle the all-important question of etiology. For this, careful house-to-house study made, if possible by salaried medical men, on full time is necessary. Such study should if possible be made during the epidemic. The value of a central bureau or committee for the regulation and supervision of this work and the interchange of information is of course apparent.

The Health Commissioner of Pennsylvania, S. G. Dixon, has just published a careful study of several epidemics occurring in that state in 1910. Nearly 800 cases were studied intensively by the department of health, all possible epidemiologic factors being investigated with great care. For full details the original, very instructive, article should be consulted. Among the observations made were the following: of 773 cases, 59 gave a distinct history of exposure to previous cases. Nationality seemed to play no etiologic role. In forty-four instances secondary cases developed in the household. The prevalence of other diseases in the community was not as great during the outbreak of poliomyelitis as has been described by some authorities.

The seasonal influence was that generally reported (*vide ante*). It is of special interest to note that in the blood of patients during the acute stage, and in the blood of monkeys, experimentally inoculated, "an organism was found, different in morphologic characteristics from any heretofore described, which may or may not on further investigation prove to be the etiologic factor in the causation of the disease." (At this writing this finding has not been confirmed by other observers.—Ed.)

With reference to etiology there is nothing absolutely definite to report. The virus is filterable (belonging in the class of organism of foot and mouth disease, etc.). It is very resistant to external agencies. It withstands glycerinization for months, drying over caustic potash for weeks. It withstands freezing, but is killed by exposure to temperature of 45° C. to 50° C. for one-half hour. It is not certain that it has ever been cultivated outside the body, though bouillon inoculated with the virus has become turbid. But paralysis has *never* been induced by inoculations with these cultures.

Lately workers in the Rockefeller Institute have succeeded in producing the disease in monkeys by the intracerebral injection of an emulsion, made from the bodies of common house-flies, which had been fed on portions of spinal cord obtained from a poliomyelitic monkey. It would seem that the transmission of the disease is not by contact or infection as in measles or scarlet, not by the ingestion of toxic material, but rather by the intermediate agency of insects. This theory is however absolutely not proved as yet, and further experiments and observations are necessary for the settlement of the question of mode of transmission.

Kraus has recently shown that the injection of poliomyelitis virus (sterilized by addition of phenol) protects the monkey against subsequent inoculation of active virus. If this were confirmed for man a large therapeutic field would be opened. Indeed active immunization of monkeys has been achieved by repeated inoculation of small doses of virus over long periods of time.

The presence of certain definite antibodies in the blood of these immunized animals has been demonstrated. Active filtrate containing virus has been mixed with the blood serum either of children or of monkeys recovered from the disease. This mixture was incubated for an hour at 37° C. and then injected into the brain of normal monkeys. In no instance did paralysis follow. (Marsh.)

Netter and Levaditi have shown that the blood serum of a child after an abortive attack also contains a similar protective agency. Efforts to produce a therapeutic serum by inducing active immunity in the lower animals have not been successful as yet. But it is worth noting that normal sheep's serum possesses a definite neutralizing power when mixed with the filtered virus. This power can be reinforced by injections of cord emulsions of recently paralyzed monkeys. Whether this can be carried to a degree sufficient to provide a therapeutic serum is not yet established.

Symptomatology: "If we think of the disease as a poliomyeloencephalitis with meningeal complications and appreciate the fact that the disease may affect any or all parts of the gray matter of the central nervous system and in all possible combinations we shall better understand the innumerable manifestations of the disease and be less likely to overlook it or mistake it for some other condition."

These words of Morse clearly present the difficulties of diagnosis. An exhaustive review of special symptoms is quite out of place in such an abstract as this.

The period of incubation apparently varies from 3-15 days. Currie and Braunwell had the opportunity of studying a sharply localized epidemic in which the incubation period averaged four days. The general prodromal symptoms most commonly observed are: irregular fever ranging from 101° to 104°, rigidity of and pain in the neck muscles, severe disturbances in the gastrointestinal tract, usually ushered in by vomiting and marked general hyperesthesia. Upon this later symptom most authors are inclined to lay very great stress.

In the preparalytic stage the cerebrospinal fluid exhibits definite evidence of the round celled infiltration of the meninges. Within forty-eight hours of inoculation the fluid is found to be under increased pressure, usually with marked increase in the cellular elements, largely of the polymorphonuclear variety. A little later the cytologic picture changes, and the cells are now predominantly of the lymphocyte type. At this time the fluid may be opalescent. These changes have disappeared by the time the palsies are manifest. The blood picture in the early stages is either negative or there is a definite leucopenia.

The Wickman classification as to types is generally recognized:—

1. The ordinary spinal form.
2. Progressive form, usually ascending (Landry type).
3. Bulbar paralysis polioencephalitis of the pons.
4. Acute encephalitic form.
5. Ataxic (cerebellar) form.

6. Polyneuritic form.
7. Meningitic form.
8. Abortive form.

Without discussing all of these forms in detail, it may be well to call attention to recent investigation in some of them. The progressive form usually runs an exceedingly rapid course. In a case recently observed by the author of this review, the child showed symptoms of pain in the legs on one morning. He died on the following afternoon, having shown complete paralysis, cyanosis, difficulty of breathing and inability to swallow in the meantime. Several cases of this type have been observed in the epidemic now existing in Cincinnati. This form is nearly always fatal, and usually runs a peracute course.

Koplik has contributed an excellent paper, clearly defining the picture of the encephalitic type of the disease. The general picture is cerebral, the symptoms are cerebral with in certain cases added palsies. Thus if the nuclei of the oculomotor nerves are affected, we have with the cerebral symptoms an ophthalmoplegia of greater or less extent. If the nuclei of the facial nerves are affected, the cerebral symptoms are supplemented by facial palsies. If the process extend still further down bulbar symptoms occur. (These latter cases are apt to be fatal.)

Some of these cases offer the greatest difficulties in diagnosis, especially from certain forms of meningitis, because these cases often simulate either meningococcic meningitis with isolated basic palsies or meningitis of the tuberculous type. Koplik's paper deals in detail with several forms of this general type. The old view that poliomyelitis was purely a motor lesion is not held at all any more. The reason for this is the exceeding frequency of cases of the polyneuritic type. The pains here may be in the joints more often are indefinite, a whole extremity being painful. On account of the pain, the extremities are often held as rigid as possible. The combination of rigidity and resistance is only possible of course when some muscles are left intact. As Morse remarks, this combination of flaccidity and spasticity leads to many errors of diagnosis during the acute stage.

Much attention is now being directed to the abortive type of the disease. According to Frost (and other observers) abortive cases are doubtless very frequent in all epidemics of any extent.

The recently published report of the committee of the American Medical Association on the control of poliomyelitis (which incidentally should be read in its entirety by all those interested in the subject) calls especial attention to the possibility of dissemination by "Abortive and clinically unrecognizable cases. The existence of such cases often so mild as to be ambulant has been inferred on clinical evidence and confirmed by the demonstration of apparently specific microbicidal properties in the blood serum of a number of suspected persons." It is of course manifestly impossible to give a comprehensive picture of all forms of the abortive type. In the presence of epidemics of the disease however, cases coming under any of the following classifications of Wickman should be regarded as being suspicious, at least until definite diagnostic criteria have been furnished.

- (a) Cases running under the picture of a severe general infection.
- (b) Cases showing marked symptoms of meningeal irritation (meningitis).
- (c) Cases in which pain and general hyperesthesia are marked (influenza-like).
- (d) Cases with severe gastro-intestinal symptoms.

Diagnosis.—The general consensus of opinion is that the diagnosis of poliomyelitis is at present impossible before the onset of the paralysis.

The general symptoms afford no definite indications, the blood picture is not constant. The symptom complex of fever, gastro-intestinal disturbance, and severe general hyperesthesia with rigidity of the neck muscles is a very suggestive one. The value of lumbar puncture at this time as a diagnostic aid is probably considerable. The fluid is under increased tension, the number of cellular elements is very greatly increased. In the very early stages the polymorphonuclear cells predominate, later these are replaced by lymphocytes. Sometimes this change only occurs with the advent of the paralysis.

Prognosis.—The mortality in the different epidemics has varied from 3-15 per cent., with an average of about 7 per cent. With the recognition of the abortive type there has also come a change in our view as to the outlook quoad restitutio ad integrum. The majority of these abortive cases make a complete recovery. Even in cases with definite paralysis complete recovery is reported in at least 10 per cent. of the cases. As is well known the severity of the initial paralysis affords no indication of the amount of permanent damage. The newer views as to pathology, namely that the condition is essentially an interstitial (perivascular exudate with edema, readily afford the explanation as to the retrogression of many apparently severe initial paralysis. The ascending, bulbar and the meningitic cases offer the worst outlook as to recovery. Even in these cases death rarely occurs after the seventh day.

Treatment.—The general recommendations of the committee of the A. M. A. include: Isolation and screening of all patients, disinfection of all discharges, fumigation of premises on release from isolation. So far as prophylaxis is concerned, experimental evidence is in favor of the use of hexamethylenamin (Flexner and Clarke) though as to this point there is still some discussion. It has been found that a 1 per cent. solution of peroxide destroys the virus, and a nasal spray of such strength has therefore been recommended. Among others however, Flexner has called attention to the fact that such a spray may be very irritating to the nasal mucosa and thus do possible harm. He advocates the use of menthol sprays in the usual strength.

With reference to direct treatment, all authors are agreed as to the therapeutic value of rest. With this the general therapeutic measures applicable to acute infections of all kinds should be included. Warm baths are held to be of value, and hot packs are also recommended. As soon as the disease is suspected hexamethylenamin (urotropin) should be given in full doses. The clinical and experimental evidence as to the value of this drug is constantly growing. It will be remembered that Flexner and Clarke have recently demonstrated that when this drug is given in full doses to monkeys, intracerebral injection of the virus of poliomyelitis altogether fails in a certain number of cases to produce paralysis, whereas in others the incubation period is prolonged from six to eight to twenty-four days.

In addition during the acute stage, symptomatic treatment, especially for the relief of pain, is indicated.

After the subsidence of acute symptoms absolute rest should be maintained until all sensitiveness along the nerve trunks has disappeared. During this stage massage and electricity are absolutely contraindicated.

After all hyperesthesia has disappeared, and while the patient still remains recumbent, mild electrical treatment should be instituted. The

faradic current should be used if there be response, if not the galvanic. The value of strychnia is probably not great, in the earlier stages it may even do actual harm.

Massage and muscle training as suggested by Sachs and Strunsky are of much value in addition.

Another point worth noting is that the early coöperation of physicians and orthopedic surgeon in these cases may often be productive of the greatest good.

In conclusion it may be well to again call attention to the fact that the Rockefeller Institute for Medical Research of New York City announces that it will devote its resources very largely during the present season to the study of infantile paralysis and to the treatment of acute cases of the disease in its hospital. Physicians and health officers desiring to coöperate in this investigation may do so by sending information concerning the occurrence and prevalence of this disease or by referring acute cases to the Hospital of the Rockefeller Institute. Dr. Flexner renews his request of last year that whenever possible, a portion of the spinal cord and of the nasopharyngeal mucosa derived from fatal cases of the disease be sent to him. Specimens should be preserved in glycerine and sent by mail to Simon Flexner, M. D., 66th St. and Ave. A., New York City.

THE SURGICAL TREATMENT OF BONE AND JOINT TUBERCULOSIS.

A REVIEW OF RECENT LITERATURE.

By NATHANIEL ALLISON, M. D., of the Editorial Staff.

1. Alapy: The Results of the Conservative Treatment of Tuberculosis of the Hip and Knee. (*Zeitschr. fuer Orth. Chir.*, Vol. XXVII, pp. 243-278, 1910.)
2. Ely: Joint Tuberculosis in Children. (*Amer. Journ. Orth. Surg.*, Vol. IX, No. 1st, August, 1911.)
3. Huntington: Operative versus Conservative Treatment of Certain Forms of Bone Tuberculosis. (*Surg. Gyn. and Obst.*, Vol. XIII, No. 4, October, 1911.)
4. Schussler: A Contribution to the Operative Treatment of Paraplegia from Tuberculous Spondylitis. (*Archiv. fuer Klin. Chir.*, Vol. XCIII, No. 4.)
5. Sohler: The Treatment of Surgical Tuberculosis with Trypsin. (*Muench. med. Wochenschr.*, No. 46, 1910.)

Alapy, in an excellent analysis of his work for ten years, sets forth the results which may be expected by properly used conservative methods in the treatment of bone and joint tuberculosis. All of his cases were of less than fifteen years of age. Plaster-of-Paris was used exclusively as apparatus. The author states that the apparatus of Helsing, which he at first used, he has found it advisable to discontinue. Deformity has been corrected by traction. He has watched the progress of the disease by taking radiograms in series, and he believes that it lasts as an active process from 3 to 12 months. After the process has become quiet, it is only necessary to apply a plaster which secures the pelvis and runs to the knee. The plaster spicas are changed every 10 or 15 days during the period of progressive improvement; afterwards, every month, and at each change a search should be made for a possible abscess. He has not found it necessary to excise fistulae, nor to perform forcible corrections. After the hip disease has become cured, and there remains an attitude of deformity, he advises a sub-trochanteric osteotomy, with correction of the deformity. Between the years of 1897 and 1907, Alapy has treated 122 cases of hip disease and has kept a careful record of complete observation on these cases. These were selected from 622 cases of hip disease which passed through his service. In 24 per cent. the results were excellent; that is, there was mobility of the joints, without shortening; in 29 per cent. the results were very good; in 14 per cent. fair, and in 33 per cent. bad. The tipping of the pelvis and an establishment of a solid joint seems to be a good result as far as walking is concerned; he found that 62 per cent. of his cured cases could walk without symptoms; 13 per cent. by limping, and 23 per cent. had to use a cane. It is difficult to appreciate the degree of shortening. It was less than 3 cm. in the

majority of cases, this corresponding favorably with the statistics of Wagner-Brun's 5 cm., and Lorenz's 3.87 cm. Atrophy of muscles was very variable and seemed to be associated with the gravity of the process. The character of the gait is an important consideration in the estimation of good results. He believes that the gait of an ankylosed hip is, perhaps, the best. Twenty-one per cent. of his cured cases walked perfectly; 35 per cent. walked well, and 19 per cent. became fatigued with active walking. Comparing these results with those obtained by early resection, Alapy has found that the mortality is very nearly the same, but the function is very much better in the cases treated conservatively. Those where resection has been done do not possess a solid, stable hip and they have shortening of from 6 to 11 cm. The duration of treatment is about three years, when conservatism is employed. It appears to be shorter where resection has been done, but the after-treatment of resection, to prevent deformity and contraction, takes a much longer time. Against the conservative treatment are mentioned the frequency of suppuration and the dangers of general tuberculosis. The results of Alapy, as far as suppuration is concerned, were excellent—better than those of other observers, and he attributes this to careful surveillance and to the injection of iodoform-glycerine. He had 2 cases die of general tuberculosis—one ten days after the first cast of milliary tuberculosis, and the other seventeen days after the first plaster was applied, the cause being not exactly clear. The author finds that his statistics here are about the same, so far as mortality is concerned, as are the statistics of Lorenz and others, where forcible correction has been used in the treatment of hip disease. The author's results in the treatment of tuberculosis of the knee are equally favorable, and his paper indicates the value of careful, conservative treatment in these cases.

Ely has pointed out that the reason for confusion in the treatment of joint tuberculosis is a failure to recognize the fundamental difference in treating adults and children. Eminent surgeons, with wide experience, in treating the joints of adults, have attempted to apply the ideas thus gained to the treatment of children's joints; and, on the other hand, those whose work brings them into contact with children have sought to carry out their theories upon adults. This is a great mistake; the structure of the bones in children and in adults, as well as the resisting powers of each, are not the same. Unmixed tuberculosis exists in bone only in its red marrow. In joints it affects also the synovia. It is limited to these two tissues, and is, therefore, localized. It is never encapsulated, and we cannot remove it. When a secondary infection is added, other tissues become vulnerable, and we have, instead of a localized disease, a widely diffused one. A tuberculous abscess, or joint which is opened, becomes, invariably, secondarily infected. Radical operations on the joints of children entail interference with the growth and the danger of unsightly and crippling deformities. The red marrow and synovia, the only tissues ever infected in pure joint tuberculosis, owe their presence in the joint and near it largely to the function in the joint; the less function there is in the joint, the less these tissues will be in it, and therefore, the less food will there be for the disease. The function of a joint is motion. If we can immobilize the joint, we can prevent the spread of the disease and best forego an indication for surgical operation. Holding fast to the principles of avoiding secondary infection and shortening in a joint will meet the requirements of treatment as pointed out by the pathology. In addition to this, the general health of the pa-

tient must be considered. The erection of hospitals in crowded cities for children with tuberculous joints is an anachronism; glass sun-parlors and closed wards are an abomination. Ely has been led to these radical statements by a careful study of the pathology of bone and joint tuberculosis, and surely what he says seems to indicate the reasons for the success which follows the proper conservative treatment of these conditions.

In direct contrast with these two papers is that of Huntington, who believes that the removal of the focus of tuberculosis at the knee, at the shoulder, the elbow and the ankle is a feasible surgical procedure, and one fully accredited. He further believes that early tuberculosis of the hip should be attacked by operative surgery. He thinks that conservatism may become a fetish. Huntington reviews the well-known arguments for and against operative treatment in tuberculous bone disease and goes on record as firmly believing in the advantages of certain early operations in certain cases. He implies that abscesses are due to conservative treatment—or, at least, that they may be prevented by operative measures. He, apparently, has had a very fortunate experience with the few cases that have come under his treatment, which consists of performing the so-called focus-eradicating operation at the neck of the femur. He believes that this operation obviates the risk of general infection, that it shortens the time of treatment from six years to five or six months, and also that with it there would be no prolonged periods of illness and suffering, no abscess formation, no shortening of the limbs, no crippling or ankylosis. These claims seem rather fanciful to anyone who has had experience, even with the literature of the operative side of bone and joint tuberculosis. A paper such as his is harmful, as it, perhaps, encourages the roughest attempts to eradicate bone and joint tuberculosis from children by operative measures.

That certain operations are advisable is beyond doubt true, but the greatest care should be exercised in deciding when an operation should be performed. A case reported by Schussler is of interest in this connection. Here a paraplegia had lasted for one year and there seemed to be no evidence that spontaneous recovery would take place. After a laminectomy of the seventh and eighth dorsal vertebrae, it was found that the spinal canal was roughened, but that the bodies of the vertebrae seemed normal. A few days after this operation the patient could dorsally flex the foot to a right angle and the spasticity of muscles disappeared gradually, so that at the end of seven months the patient could walk unassisted, and from then on improvement was rapid.

Another tendency in the treatment of these affections is that toward injecting substances into the area of the disease, with the hope that such injections will cause a cure of the process. Perhaps the last substance injected is trypsin. Sohler experimented with trypsin, and has found that it is a worthless injection, being both painful and dangerous. The trypsin not only dissolves the diseased tissue, but affects the normal tissues, and the chances of cure were made less by the fact that the joint cartilages were loosened, and that the soft tissues were invaded by the pus. The hyperemia and irritation caused by the trypsin had better be produced by some substance, or in some manner which is less dangerous to the patient.

In general, it may be said that tuberculosis of the bones and joints has been proven to be most successfully treated by conservative measures, and this is especially true in the case of bone and joint involvement in childhood.

DIAGNOSTIC AND THERAPEUTIC NOTES.

VERONAL.—von Noorden (*Therap. d. Gegenw.*, 1911, No. 6). Prof. von Noorden has found that veronal is a much more efficient somnifacient when combined with a small dose of phenacetine. If there is cough, he also adds a little codein. An average dose would be: veronal 0.3 gm., phenacetin 0.25 gm., codein phosphate 0.03 gm.

A NEW USE OF YOHIMBIN.—Fritsch (*Deutsch. med. Wochenschr.*, 1911, No. 27). Fritsch finds that the bladder disturbances of old people, that show themselves chiefly as incontinence or as bladder atony are favorably influenced by small doses of yohimbin. One tablet daily for three days, followed by an interval of three days, whereupon the medication is resumed, usually suffices. Good results have also been obtained in juvenile incontinentia urinae.

MICROSCOPIC EXAMINATION OF BILE.—Petry (*Wien. klin. Wochenschr.*, 1911, No. 26). Bile may be obtained for examination by introducing 200 gm. olive oil into the fasting stomach and withdrawing it after a proper interval. The microscopic examination of the bile so obtained often gives useful diagnostic information. In cases of cholelithiasis the bile almost always contains concretions microscopic in size. These are either small individual stones or tiny crystalline splinters of larger ones. In either case, the diagnosis of gall-stones is justified.

A NEW TREATMENT OF EPILEPSY.—Fackenheim (*Muench. med. Wochenschr.*, 1911, No. 35). In 1906, Dr. L. E. Self of Claiborne, Texas, observed the curious case of a man who, having suffered for fifteen years from epilepsy, was bitten by a rattlesnake; he recovered and thereafter remained entirely free from epileptic attacks. When Dr. Self reported this case in 1908 he had kept him under close observation for two years. Dr. Ralph Spangler, of Philadelphia, had for some time been experimenting with dilute rattlesnake poison in a variety of diseases and was led by Dr. Self's observation to try it in epilepsy. In the New York Medical Journal of September 3rd, 1910, he reported eleven cases so treated with very definitely encouraging results, all of these being improved and some of them apparently cured. Dr. Fackenheim of Kassel received some of the poison from Dr. Spangler and reports five cases treated with it; none of them cured as yet, but all of them greatly improved.

When properly administered, rattlesnake poison, or crotalin, as the purified product is named, seems quite free from danger. One death is reported, to be sure, but that was a five-year-old-child who received doses that would have been large for an adult. When injected, not oftener than once a week and in doses slowly increasing from five to twenty milligrams, no constitutional ill effects have been observed. The local reaction is however sometimes very severe and may last several days.

Crotalin is obtained by squeezing out the contents of the poison sack of the rattlesnake, *crotalus adamanteus*. The poison is dried, pulverized, purified, redissolved and preserved sterile in sealed ampules, each of which contains a single dose.

CYTODIAGNOSIS IN GASTRIC DISEASE.—Loeper and Binet (*Soc. Méd. d. hôpit.*, 1911, May 5). The writers examined the water obtained by lavage of the fasting stomach for cellular elements and believe that diagnostic conclusions can be drawn from the nature of the cells found. In gastric ulcer, without hemorrhage, they found red blood cells, epithelial cells and leukocytes; in gastritis, they found white blood cells of all kinds and bits of glandular tissue; in cancer, large polynuclear cells, staining deeply and rich in glycogen. These observations, if correct, would be of great importance, but obviously they require confirmation.

ABDOMINO-RECTAL GYMNASTICS IN CHRONIC CONSTIPATION.—Fernet (*Journ. de Med. et de Chir.*, 1911, No. 13). For the rather frequent cases of functional constipation without an organic basis, Fernet, in a recent address before the Academie de Medicine of Paris, advocated systematic abdominal and rectal gymnastics. Every morning the patient, before rising, lies flat on his back and with shut mouth takes five or six slow, deep inspirations as purely abdominal as possible. The two hands placed upon the abdomen enable the patient to gauge the depth of the respiration and are of appreciable aid in carrying out this procedure. After a few moments' rest, the deep respirations are repeated and so on, four or five times. These respiratory gymnastics put into action successively the diaphragm and the abdominal muscles and produce an efficient massage of the organs contained in the abdomen. In the intervals between the deep respirations, a light colonic massage may be practiced in the usual manner. Often this results in a desire to defecate, which should however be resisted.

After breakfast, which should be slowly eaten and carefully chewed, the patient goes to the closet. If defecation does not result spontaneously, the respiratory gymnastics should be resumed, alternating with anal exercises. These consist of alternate gentle attempts at defecation and retention, being thus alternate contractions and relaxations of sphincter and levator ani. This will usually result in a movement; if it does not, the rectum should be washed out by means of an enema. If persisted in, this procedure will usually result in the establishment of daily, spontaneous evacuations. Where it fails absolutely, the cause is either some anatomic lesion responsible for the constipation or a failure, on the part of the patient, to carry out accurately the instructions outlined above.

CORRESPONDENCE

ASEPSIS IN MODERN PRIVATE OBSTETRICS.

ROODHOUSE, ILLINOIS, November 13, 1911.

To the Editors of the Interstate Medical Journal:—On page 1083 of the November number of your JOURNAL, Dr. Palmer Findley (in his article on the Surgical Treatment of Puerperal Sepsis) makes the following statement: "To-day it may be fairly stated that the percentage of morbidity and mortality of puerperal sepsis in hospitals has been materially reduced while in private practice there has been little or no reduction."

Now I think the doctor errs in the latter part of his statement, *i. e.*, that sepsis is as frequent in obstetrics now as formerly in private practice. The assertion will not apply to this locality at any rate. (Green Co., Ill.) Probably the doctor has examined the mortality reports and bases his statement upon his findings but of this I am quite sure that in the last 12 years I can recall only 3 deaths from puerperal sepsis in this section. The doctors whom I have in mind in this locality attend from 30 to 80 cases of obstetrics annually and it is seldom indeed that we hear of a case of puerperal sepsis. I have been told by older practitioners that 25 to 30 years ago the trouble was much more common. My observation has led me to believe that the rural practitioner (as a class) handles obstetrics as carefully and as skilfully as the city practitioner and I have observed the methods of both, while in the city doing post-graduate work and my practice in the country. Similar statements to the above have been made in other medical journals and I think the time has arrived for a protest from the country doctor. The doctors in this locality who make any pretense of doing careful and up-to-date work carry their operating gowns, soap, antiseptics, and sterile nail brushes, and there is no better surgical basin than an earthen milk crock sterilized by heat. In fact the laity in this community have learned that puerperal sepsis is a preventable disease, and if a doctor should have a very few serious cases I am inclined to think he would soon be out of an obstetric practice. Occasionally we have sepsis following a criminal abortion, but such cases are handled with gloves, and especial care is taken that instruments, clothing, etc., are sterilized before attending obstetrical cases afterwards. Trusting you will give this space in your JOURNAL, I am fraternally.

H. W. SMITH.

OMAHA, November 18, 1911.

Editors, Interstate Medical Journal:—I am in receipt of your communication of the 16th instant requesting a brief reply to the enclosed copy of a letter signed by Dr. H. W. Smith of Roodhouse, Illinois, who takes exception to my statement that there has been little or no reduction in the percentage of morbidity and mortality of puerperal sepsis in private practice.

The doctor construes my statement as a direct reflection upon the country doctor. Let him read his own quotation of my statement and

he will see that there was no direct reference made to the country doctor. "Private practice" obtains in the city as well as in the country, and is a part of the day's work of the attending obstetrician to maternity hospitals as well as of the general practitioner in city or country. Hence we are all in the same boat. And who would maintain that the parturient woman is as well safeguarded in the home as in a well regulated maternity? In the days of Semmelweis the maternity wards were hot beds of infection, but to-day the safeguards surrounding the inmates of modern maternities are such as to minimize the sources of contagion. In 1847 the mortality of child bed fever in the Vienna Maternity was over 10 per cent. Semmelweis made an immediate reduction from over 10 per cent. to about 1 per cent. by the introduction of definite rules pertaining to the management of cases by the students, assistants and midwives. Now we boast of a mortality not greater than one-fourth or one-third of one per cent. in our modern maternities.

Do these safeguards, which have well nigh banished puerperal sepsis from our modern maternities, prevail in the homes of our private cases? The doctor may be ever so exacting in his enforcement of surgical principles and his good work be undone by the nurse who may know nothing of surgical cleanliness.

I know of no reliable statistics of the obstetric work done in this country bearing upon this point, but we have statistics compiled by Winckel on 7,000,000 cases in Germany which shows the mortality from child bed fever was about 30 per cent. greater in the country and provincial towns than in 25 of the large cities where the work was largely done in maternities.

My own impressions have been acquired not only from the literature, but to a greater degree from personal observations. When we consider the morbidity as well as the mortality of child bed fever, we are profoundly impressed with its frequency. It is a matter of every day experience that I examine women with pelvic inflammatory lesions who date their troubles from a miscarriage or child birth, and yet upon questioning them, they are not aware that they had fever in child bed. All they know is that they got up from their bed slowly and that they have suffered ever since. All this frequently goes on without the knowledge of the physician for want of routine visits throughout the puerperium. The doctor is right when he says child bed fever is preventable, but it is manifestly unfair to hold the medical profession accountable for the meddling interference of unskilled nurses, of ignorant patients and, last but not least, for the existence of latent gonorrheal infections which account for not less than 12 per cent. of puerperal infections.

If Dr. Smith will try the experiment of making a systematic examination of one hundred women who have borne children, I am sure he will find a surprising number among them who date their complaint to child birth and that not a small per cent. of them will reveal some pelvic inflammatory lesion, the final result of a puerperal infection.

PALMER FINDLEY.

PROLONGED PREGNANCY.

TORONTO, November 14, 1911.

To the Editors, Interstate Medical Journal:—Dr. Gillespie was very kind in honoring me by writing a "review" of my short article on "Prolonged Pregnancy," published in the INTERSTATE MEDICAL JOURNAL of

October last. This review is published in the *Lancet-Clinic*, November 4, 1911. While it is scarcely expedient to attempt to discuss all the points raised it seems advisable to make a few comments.

The evils of protracted pregnancy have been recognized for a long time, but definite knowledge of such evils is comparatively recent. Many obstetricians have been studying the question very carefully for the last fifteen years, and have reached conclusions which are singularly alike. I should strongly advise anyone who takes special interest in this subject to read an article by Joseph B. De Lee, published in "*Surgery, Gynecology and Obstetrics*," July, 1907. In speaking of the effects of prolonged pregnancy on the child, he says: the head becomes "harder," the greater "ossification" being "striking," "spinal column is less flexible," etc., which anomalies cause "lack of cephalic moulding," "occipito-posterior positions," "prolonged and fruitless labor," "forceps," "hard extractions," "extensive injuries," "postpartum hemorrhage." It should be stated, however, that these few expressions give one only a partial idea of De Lee's clean and concise description of such evil results.

Herbert M. Little, for several years head of the service in the Montreal Maternity, in an article on The Induction of Labor, published in "*The Journal of Obstetrics and Gynecology of the British Empire*," September, 1910, says: "The frequency of protraction of pregnancy is becoming more and more widely recognized, and, according to the authorities in Winckel's System, occurs in 16 per cent. of all pregnancies. During the last few years there have been a number of serious cases of dystocia, particularly among the private patients in the hospital, on account of the birth of a child unusually heavy, even though the pelvis was normal. Against induction of labor in these cases nothing can be said."

Dr. Gillespie is a total stranger to me, so far as I know, and his tone and attitude towards me in accusing me of "eagerness to foist his (my) pet delusion upon the profession" are incomprehensible. However, that is unimportant, and will not affect my attitude towards him, which, I hope, will be courteous. He has raised a point in connection with the babe of thirteen or fourteen pounds which is well worth considering. My statement that "the probable increase in the tenth month is 2,000 gms.," is to some extent misleading. Such increase occurs in only a limited proportion of cases, but an increase of 900 to 1,400 gms. (approximately two to three pounds) is quite common. The greater increase only occurs when the child remains healthy after term, which many of us think is not generally the case. We think however that no one is yet in a position to express very definite opinions in that regard.

The statistics given are not my own, and I don't happen to know whether they are exactly correct or not; but I think they are generally accepted. I fear that I have been misunderstood with respect to occipito-posterior positions. I simply mean that they occur with undue frequency in labors after prolonged pregnancy. Whether such be cause or effect need not now be discussed.

Dr. Gillespie says: "Whenever by bimanual manipulation the head of the child cannot be made to enter the mother's pelvis the time for considering the immediate necessity for inducing labor has arrived." This is an old rule, and a good one, especially in the case of slightly contracted pelvis; but many of us do not rely on it alone in prolonged pregnancy. Dr. De Lee probably has such a rule in mind when he advises cephalometry according to Perrat's plan. As I understand him he examines his patient in the ninth month, takes into consideration all the circumstances

and conditions, and decides when she has reached term. He then waits one week, and if labor does not come on he sets a date to induce it. I presume his rule is not to let a patient go more than eight to fourteen days beyond term before interfering. In considering any individual case we should study the situation in all its aspects. The relationship between the child and pelvis is only one of the important points.

Let us briefly run over the various phases in prolonged pregnancy. First: As to mother: The emotional element is seriously affected, there is anxiety with loss of sleep, the general health is impaired, various organs and tissues become more or less diseased, there is probably fatty degeneration of the uterine muscle (Bossi). As to child: It is frequently or generally unduly large, it is altered in consistence, the head is not only unduly ossified but also changed in shape chiefly because of greater parietal diameter.

When labor comes on the uterine contractions are irregular and defective, the accompanying pains are severe, the contractions after many weary hours cease at the time when the greatest expulsive force is required, interference becomes necessary, there is difficult extraction. After the completion of the third stage the mother is exhausted, post partum hemorrhage is frequent, septicemia is not uncommon, at best recovery is slow, and in many cases the patient is crippled for life. The child is frequently still-born, or, if alive, quite cyanotic, and feeble in every way, often dying within two or three days.

Most, if not all, of these very serious conditions and results are fairly well recognized, but are not properly appreciated in their entirety. Most obstetricians do not interfere in any case, some interfere when "symptoms indicate," a few interfere before conditions become serious. Upon the whole I think De Lee's rules of procedure are excellent. In my own practice for the last seven years I have generally interfered if labor has not come on in from two to twelve days after term. It is not considered desirable to refer to certain exceptional cases in this communication.

Between twelve and fifteen years ago three very distressing cases of prolonged pregnancy followed by disastrous results, came under my observation. In all three the labors were prolonged and very difficult. Two mothers and three children died. I happened to learn much from those cases, and I have been studying ever since. I feel very keenly the responsibility I assume when I teach students comparatively new procedures, and I endeavor to be very careful and cautious. In addressing my fellow practitioners who have had more or less experience I speak with more freedom, and always with a hope that by an interchange of opinions we may learn much from each other. I don't know that I have taught much during my professional career, but I do know that I have learned much from the *other fellows*.

I am not wedded to the method of procedure I have described. I like the method described by De Lee, which is very much like that which I learned from Dührssen many years ago, and which I now use especially in certain accidents and procedures of earlier pregnancy. I shall use nearly the words of De Lee who says the method is "not original with him." He uses a tubular curved packer, and a special gauze (a woven bandage) made up in strips five yards long (kept in sterile jars). He uses the tubular packer which is put in the cervix, and by gently rotating the instrument he packs all round the lower uterine segment. The operation is simple and can be done without an anesthetic.

ADAM H. WRIGHT.

BOOK REVIEWS.

A TREATISE ON DISEASES OF THE EYE. By John Elmer Weeks, Professor of Ophthalmology in the University of Bellevue Hospital Medical College, Medical Department of the New York University; Surgeon to the New York Eye and Ear Infirmary, etc. With 528 engravings and 25 full page plates in colors. 944 pp. Lee & Febiger: New York and Philadelphia. 1910.

In preparing this volume, it has been the aim of the author to produce a treatise on ophthalmology that shall "enable the undergraduate in medicine to obtain a sufficiently comprehensive and trustworthy knowledge of the subject, a book to which the practitioner of medicine may refer for information regarding questions concerning the eye, and also a book which may be of use to the specialist in ophthalmology." It will be generally admitted that Dr. Weeks has accomplished the objects alluded to above. Too frequently the medical author, in attempting to kill three birds with one stone, misses every one and produces a book which is unsatisfactory alike to the undergraduate, the general practitioner and the specialist. But no such failure can be recorded against Dr. Weeks' most excellent book. Every one of its 944 pages is packed with information. The presentation is direct and while lacking in literary frills, is distinguished by a quiet elegance of diction. Altogether it is a work which can be unreservedly recommended to all who desire a mirror of modern ophthalmic teachings and practice.

HINTS FOR THE GENERAL PRACTITIONER IN RHINOLOGY AND LARYNGOLOGY. By Dr. Johann Fein, Privatdocent at the University of Vienna. Translated by J. Bowring Horgan, M. B., B. Ch. Late House Surgeon at the Hospital for Diseases of the Throat, Golden Square, London, W. With Forty Figures in the Text and Two Photographic Plates. New York: Rebman Company. Price, Cloth \$1.50.

To one who has worked with Dr. Fein in his own clinic, and who has accordingly had there an opportunity to follow his careful methods, the appearance of the above work is indeed a gratification. Nothing is more unfortunate than for the practitioner of little or no training to attempt treatment or operations of which he is incapable. On the other hand there are many cases referred to the average specialist which could be treated quite as successfully by the physician who referred them. This little book should teach the practitioner his limitations, as well as his possibilities. If it does this it will be a distinct contribution to medical literature in this country, and will have fulfilled the purpose which the author so well expresses in his preface. Unfortunately, we fear the book may not have the circulation which it so well deserves.

NEW AND NON-OFFICIAL REMEDIES, 1911. Containing Descriptions of the Articles which have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association, prior to January 1, 1911. Chicago: Press of the American Medical Association. 1911. Price, paper 25c; cloth 50c.

This is the 1911 edition of the Annual New and Non-Official Remedies, issued by the Council of Pharmacy and Chemistry of the American Medical Association, and contains descriptions of all articles approved by the Council up to December 31st, 1910. There are also descriptions of a number of unofficial non-proprietary articles which the Council deemed of value. The action, dosage, uses and tests of identity, purity and strength of articles are given.

VERHANDLUNGEN DES VEREINS DEUTSCHER LARYNGOLOGEN 1911. Herausgegeben vom Schriftfuehrer Dr. Richard Hoffmann-Dresden. Wuerzburg: Curt Kabitzsch. 1911. Price, 7m.

The transactions of the Society of German Laryngologists truly represent the annual progress in the special field of laryngology. The volume just issued contains the 31 papers read before the last meeting of this distinguished society held in Frankfurt-on-the-Main in May, 1911.

BOOKS RECEIVED.

- THE MEDICAL EXPERT AND OTHER PAPERS. By Louis J. Rosenberg, New York: Broadway Publishing Co. Price, 25 cents.
- L'ANAPHYLAXIE. Par Charles Richet, Professeur a la Faculte de Medecine de Paris. Paris: Librairie Felix Alcan. 1911.
- WHAT TO EAT AND WHY. By G. Carroll Smith, M. D., Boston, Mass. Philadelphia and London: W. B. Saunders Company. 1911. Price, \$2.50.
- L'ANESTHESIE LOCALE EN DENTISTERIE OPERATOIRE. La Novocaine. Par Ch.—J. Fleischmann. Avec une preface de M. le Dr. J. Tellier. Paris: Octave, Doin et Fils. 1911.
- APPLIED ANATOMY AND ORAL SURGERY FOR DENTAL STUDENTS. By Robert H. Ivy, M. D., D. D. S., Assistant Oral Surgeon at the Philadelphia General Hospital; Assistant Surgeon, Out-Patient Department, University, Philadelphia. Illustrated. Philadelphia and London: W. B. Saunders Company. 1911. Price, \$1.50.
- THE SOCIAL EVIL IN CHICAGO. A Study of Existing Conditions, with Recommendations by The Vice Commission of Chicago, a municipal body appointed by the Mayor and the City Council of the City of Chicago, and submitted as its report to the Mayor and City Council of Chicago. Chicago: Gunthorp-Warren Printing Company. 1911.
- SCIENCE IN THE KITCHEN. By Ella Eaton Kellogg. A Scientific Treatise on Food Substances and their Dietetic Properties, together with a Practical Explanation of the Principles of Healthful Cookery. A Thousand Choice, Palatable, and Wholesome Recipes. Revised and Enlarged Edition. Battle Creek, Mich.: Good Health Publishing Co. 1910. Price, \$3.00.
- LEHRBUCH DER ALLGEMEINEN PATHOLOGIE UND DER PATHOLOGISCHEN ANATOMIE. Von Prof. Dr. Hugo Ribbert, Ordentlichem Professor der Allgemeinen Pathologie und der Pathologischen Anatomie und Direktor des Pathologischen Institutes der Universitaet Bonn Geh. Med.-Rat. Mit 848 Figuren. 4 Auflage. Leipzig: Verlag von F. C. W. Vogel. 1911. Price, paper, 16m., cloth, 18m.
- REFRACTION AND VISUAL ACTIVITY. By Kenneth Scott, M. D., C. M., F. R. C. S. Edin., Consulting Ophthalmic Surgeon to St. Mary's Hospital for Women and Children, London, E.; Late Lecturer on Ophthalmology West London Post-Graduate College; Professor on Ophthalmology, Egyptian Government Medical School, etc. With sixteen illustrations and a coloured plate. New York: Rebman Company. 1911. Price, \$1.75.
- COMPENDIUM OF REGIONAL DIAGNOSIS IN AFFECTIONS OF THE BRAIN AND SPINAL CORD. A Concise Introduction to the Principles of Clinical Localization in Diseases and Injuries of the Central Nervous System. By Robert Bing, Privat-Dozent for Neurology in the University of Basle. Translated by F. S. Arnold, B. A., M. B., B. Ch. (Oxon.). Revised by David I. Wolfstein. With seventy illustrations. New York: Rebman Company. Price, \$2.50.
- A POCKET MEDICAL DICTIONARY giving the Pronunciation and Definition of the Principal Words used in Medicine and the Collateral Sciences. Including very complete tables of the arteries, muscles, nerves, bacteria, bacilli, micrococci, spirilla, and thermometric scales, and a new dose-list of drugs and their preparations, in both the English and metric systems of weights and measures, based upon the Eighth Revision U. S. Pharmacopoeia, also a veterinary dose table. By George M. Gould, A. M., M. D., Author of "The Illustrated Medical Dictionary," etc. Sixth Edition, Revised and Enlarged. 34,000 words. Philadelphia: P. Blakiston's Son & Co. 1911. Price, \$1.00.

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BOOKS RECEIVED—Continued from page 1236.

- THE PRACTITIONER'S VISITING-LIST. 1912. Thirty Patients per Week. Philadelphia and New York: Lea and Febiger. Price, \$1.25.
- DIAGNOSE UND FEHLDIAGNOSE GEHIRNERKRANKUNGEN AUS DER PAPILLA NERVI OPTICI. Von Professor Dr. Fr. Salzer, Muenchen. Mit 29 Abbildungen auf 2 farbigen Tafeln. Muenchen: J. F. Lehmann. 1911. Price, 1.50 m.
- SERUM DIAGNOSIS OF SYPHILIS AND THE BUTYRIC ACID TEST FOR SYPHILIS. By Hideyo Noguchi, M. D., M. Sc., Associate Member of the Rockefeller Institute for Medical Research, New York. 14 illustrations. Second edition. Philadelphia and London: J. B. Lippincott Co. Price, \$2.50.
- NOSTRUMS AND QUACKERY. Articles on the Nostrum Evil and Quackery Reprinted from the Journal of the American Medical Association. Part I, Quackery; Part II, Nostrums; Part III, Miscellaneous. First Edition. Chicago: Press of the American Medical Association. Price, \$1.00.
- UEBER NEUROREZIDIVE NACH SALVARSAN UND NACH QUECKSILBERBEHANDLUNG. Ein Beitrag zur Lehre von der Fruehsyphilis des Gehirns. Von Dr. J. Benario. Mit einem Vorwort von Wirkl. Geheimen Rat P. Ehrlich. Mit 1 Tafel und 5 Figuren im Text. Muenchen: J. F. Lehmann. Price, 6 m.
- TEXTBOOK OF OPHTHALMOLOGY. By Dr. Ernst Fuchs, Professor of Ophthalmology in the University of Vienna. Authorized Translation from the Twelfth Revised and Greatly Enlarged German Edition with Numerous Additions by Alexander Duane, M. D., Surgeon Ophthalmic and Aural Institute, New York. With 441 illustrations. Fourth Edition. Philadelphia and London: J. B. Lippincott Co. Price, \$6.00.
- CLINICAL DIAGNOSIS. A Textbook of Clinical Microscopy and Clinical Chemistry for Medical Students, Laboratory Workers, and Practitioners of Medicine. By Charles Phillips Emerson, A. B., M. D., Late Resident Physician, The Johns Hopkins Hospital; and Associate in Medicine, The Johns Hopkins University; Professor of Medicine, Indiana University School of Medicine. Third Edition. Philadelphia and London: J. B. Lippincott Co. Price, \$5.00.
- PAIN. Its Causation and Diagnostic Significance in Internal Diseases. By Dr. Rudolph Schmidt, Physician to the Royal Empress Elizabeth Hospital, Vienna. Translated and Edited from the Second Enlarged and Revised German Edition by Karl M. Vogel, M. D., Assistant Professor of Clinical Pathology, College of Physicians and Surgeons, Columbia University, etc., and Hans Zinsser, A. M., M. D., Professor of Bacteriology, Leland Stanford, Jr. University. Second Edition. Philadelphia and London: J. B. Lippincott Co. Price, \$3.00.
- A HANDBOOK OF MEDICAL DIAGNOSIS. In Four Parts. I. Medical Diagnosis in General; II. The Methods and Their Immediate Results; III. Symptoms and Signs; IV. The Clinical Applications. For the Use of Practitioners and Students. By J. C. Wilson, A. M., M. D., Professor of the Practice of Medicine in the Jefferson Medical College, and Physician to Its Hospital; Physician to the Pennsylvania Hospital; Physician in Chief to the German Hospital, Philadelphia. 418 Text Illustrations and 14 Full-Page Plates. Third Edition, thoroughly revised. Philadelphia and London: J. B. Lippincott Co. Price, \$6.00.
- TUBERCULOSIS AS A DISEASE OF THE MASSES AND HOW TO COMBAT IT. Seventh American Edition Enlarged and Revised with 64 Illustrations. Motto: To combat consumption as a disease of the masses successfully requires the combined action of a wise government, well trained physicians, and an intelligent people. Prize Essay by S. Adolphus Knopf, M. D., New York, Professor of Phthisio-Therapy at the New York Post-Graduate Medical School and Hospital; Director in the National Association for the Study and Prevention of Tuberculosis, etc. The "International Congress to Combat Tuberculosis as a Disease of the Masses," which convened at Berlin, May 24th to 27th, 1899, awarded the International Prize to this work through its Committee on July 31st, 1900. First American Edition, 1901; Seventh American Edition, 1911. There have been issued 27 Foreign Editions in 24 different languages. New York: The Survey. 1911. Price, 25 cents.

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